28-35

Kansas Administrative Regulations
Kansas Department of Health and Environment

Notice to Reader

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Where possible KDHE will append changed regulations to the appropriate article. Once again, the lack of any attachments should not be construed as meaning there are no revisions.

Nothing contained herein should be construed as legal advice by KDHE. If you are not an attorney, you should secure competent counsel to interpret the regulations and advise you.

Office of Public Information
Kansas Department of Health & Environment

Notes

The *Kansas Register* notes the following changes:

(3) The preliminary plans shall include:

(A) Sketch plans of the basement, each floor, and the roof indicating thereon the space assignment, size, and outline of fixed equipment;

(B) all elevations and typical sections;

(C) a plot plan showing roads and parking facilities; and

(D) areas and bed capacities by floors.

(4) The outline specifications shall consist of a general description of the construction, air conditioning, heating, and ventilation systems.

(5) Contract documents shall consist of working drawings that are complete and adequate for bidding, contract, and construction purposes. Specifications shall supplement the drawings to fully describe the types, sizes, capacities, workmanship, finishes, and other characteristics of all materials and equipment. The architect shall certify contract documents are in compliance with subsections (a), (b), and (c) of this regulation.

(e) Access. Representatives of the licensing agency shall, at all reasonable times, have access to work wherever it is in preparation or progress and the contractor shall provide proper facilities for such access and inspection. A complete set of plans and specifications shall be available on the job site for use by licensing agency personnel. (Authorized by and implementing K.S.A. 65-431; effective, T-87-51, Dec. 19, 1986; effective May 1, 1987.)

28-34-95 to 28-34-124. **Reserved.**

28-34-125. (Authorized by and implementing K.S.A. 65-431; effective May 1, 1987; revoked June 28, 1993.)

Article 35.—RADIATION

28-35-1 to 28-35-28. **Reserved.**

28-35-29 to 28-35-31. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-32. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-33 to 28-35-38. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-39. (Authorized by K.S.A. 48-1607, 48-1611; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-40 to 28-35-53. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-54. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-55. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-56. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-57. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-58 and 28-35-59. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-60 to 28-35-70. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-71. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-72. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-73 and 28-35-74. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-75 to 28-35-81. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-82. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-83 to 28-35-93. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-94. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-95 to 28-35-98. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-99. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-100 to 28-35-115. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-116. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-117. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-118 and 28-35-119. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-120 and 28-35-121. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-122. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-123. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-124. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-125 to 28-35-129. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; revoked Jan. 1, 1970.)

28-35-130. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1966; amended Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-131. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1967; revoked Jan. 1, 1970.)

28-35-132. **Reserved.**

PART 1.—GENERAL

28-35-133. **Persons protected.** These regulations state the requirements that shall be applied in the use of all radiation, radiation machines, and radioactive materials to ensure the maximum protection of the public health and the maximum safety to all persons at, or in the vicinity of, the place of use, storage, or disposal of sources of radiation. These regulations are intended to be consistent with the best use of radiation machines and radioactive materials, and to encourage the constructive uses of radiation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-134. **Persons regulated and exempted.** Except as otherwise specified, these regulations shall apply to all persons who receive, possess, use, transfer, own or acquire any source of radiation. However, nothing in these regulations shall apply to any person to the extent that the person is subject to regulation by the United States nuclear regulatory commission. Regulation by the secretary of source material, by-product material, and special nuclear material in quantities not sufficient to form a critical mass is subject to the provisions of the agreement between the department and the U.S. nuclear regulatory commission and to part 150 of the commission's regulations (10 CFR Part 150), as in effect on January 29, 1982. The provisions of part 4 of these regulations shall not limit the exposure of patients to radiation for the purpose of diagnosis or therapy, by persons licensed to practice one or more of the healing arts within the authority granted to them by the Kansas healing arts statutes, or by persons licensed to practice dentistry or podiatry within the authority granted to them by Kansas licensing laws applying to dentists and podiatrists. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-135. **Definitions.** As used in these regulations: (a) "A_1" means the maximum activity of special form radioactive material permitted in a type A package.

(b) "A_2"means the maximum activity of radioactive material, other than special form radioactive material, permitted in a type A package. These values are either listed in K.A.R. 28-35-221b appendix A, table I, or may be derived in accordance with the procedure prescribed in 28-35-221b appendix A of these regulations.

(c) "Accelerator-produced material" means any material made radioactive by exposing it in a particle accelerator.

(d) "Act" means the "nuclear energy development and radiation control act," K.S.A. 48-1601 *et seq.*, as amended.

(e) "Activity" means the rate of disintegration, transformation or decay of radioactive material. The units of activity are the becquerel (Bq) and the curie (Ci).

(f) "Adult" means an individual who is 18 or more years of age.

(g) ''Agreement state'' means any state with which the United States nuclear regulatory commission enters, or has entered, into an effective agreement under Section 274b of the atomic energy act of 1954, as amended by 73 Stat. 689, as in effect on November 1, 1982.

(h) ''Airborne radioactive material'' means any radioactive material dispersed in the air in the form of dusts, fumes, mists, vapors, or gases.

(i) ''Annual limit on intake (ALI)'' means the derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 0.05 Sv (5 rem) or a committed dose equivalent of 0.5 Sv (50 rem) to any individual organ or tissue. ALI values for intake by ingestion and by inhalation of selected radionuclides are given in K.A.R. 28-35-233b table I, collumns 1 and 2, of appendix B.

(j) Areas.

(1) ''Airborne radioactive area'' means:

(A) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations in excess of the derived air concentrations (DAC) specified in K.A.R. 28-35-233b, appendix B, table I, and any amendment of that rule and regulation; or

(B) any room, enclosure, or operating area in which airborne radioactive material exists in concentrations such that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake ALI or 12 DAC-hours.

(2) ''Controlled area'' means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee or registrant for any reason.

(3) ''High radiation area'' means any area which is accessible to individuals, in which there exists radiation at such levels that a major portion of the body could receive, in any one hour, at 30 centimeters from the source of the radiation or any surface that the radiation penetrates a dose to the whole body in excess of 100 millirems. For purposes of these regulations, rooms or areas in which diagnostic x-ray systems are used for healing arts purposes shall not be considered high radiation areas.

(4) ''Radiation area'' means any area which is accessible to individuals, in which there exists radiation at such levels that at 30 centimeters from the source of the radiation or any surface that the radiation penetrates an individual could receive a dose equivalent in excess of five millirems.

(5) ''Restricted area'' means any area, the access to which is limited by the licensee or registrant for the purpose of protecting individuals against undue risks from exposure to sources of radiation. The term ''restricted area'' shall not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

(6) ''Site boundary'' means that line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee or registrant.

(7) ''Unrestricted area'' means an area, access to which is neither limited nor controlled by the licensee or registrant. For purposes of these regulations, ''uncontrolled area'' shall be considered an equivalent term.

(8) ''Very high radiation area'' means an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of five Gy (500 rad) in one hour at one meter from a source of radiation or from any surface that the radiation penetrates.

(k) ''As low as is reasonably achievable (ALARA)'' means making every reasonable effort to maintain exposures to radiation as far below the dose limits in these regulations as is practical, consistent with the purpose for which the licensed or registered activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed or registered sources of radiation in the public interest.

(l) (1) ''Background radiation'' means:

(A) radiation from cosmic sources;

(B) naturally occurring radioactive materials, including radon, except as a decay product of source or special nuclear material; and

(C) global fallout as it exists in the environment from the testing of nuclear explosive devices.

(2) The term ''background radiation'' shall not include sources of radiation from radioactive materials regulated by the department.

(m) "Becquerel (Bq)" means the SI unit of activity. One becquerel is equal to one disintegration or transformation per second (dps or tps).

(n) "Bioassay" means the determination of kinds, quantities or concentrations, and, in some cases, the locations of radioactive material in the human body, whether by direct measurement, in vivo counting, or by analysis and evaluation of materials excreted or removed from the human body. For purposes of these regulations, "radiobioassay" shall be considered an equivalent term.

(o) "Brachytherapy" means a method of radiation therapy in which sealed sources are utilized to deliver a radiation dose at a distance of up to a few centimenters, by surface, intracavitary, or interstitial application.

(p) "Calendar quarter" means not less than 12 nor more than 14 consecutive weeks. The first calendar quarter of each year shall begin in January and subsequent calendar quarters shall be arranged so that no day is included in more than one calendar quarter and no day in any one year is omitted from inclusion within a calendar quarter. A licensee or registrant shall not change the method of determining and observing calendar quarters for purposes of these regulations except at the beginning of a calendar year.

(q) "Calibration" means the determination of:

(1) the response or reading of an instrument relative to a series of known radiation values over the range of the instrument; or

(2) the strength of a source of radiation relative to a standard.

(r) "Chelating agent" means amine polycarboxylic acids, hydroxycarboxylic acids, gluconic acid, and polycarboxylic acids.

(s) "Class" means a classification scheme for inhaled material according to its rate of clearance from the pulmonary region of the lung. Materials are classified as D, W, or Y, which applies to a range of clearance half-times: for class D, days, of less than 10 days, for class W, weeks, from 10 to 100 days, and for class Y, years, of greater than 100 days. For purposes of these regulations, "lung class" and "inhalation class" shall be considered equivalent terms.

(t) "Curie" means a unit of quantity of radioactivity. One curie (Ci) is that quantity of radioactive material which decays at the rate of 3.72×10^{10} transformations per second (tps). Commonly used submultiples of the curie are the millicurie and the microcurie. One millicurie (mCi) = 0.001 curie = 3.7×10^{7} tps. One microcurie (μCi) = 0.000001 curie = 3.7×10^{4} tps.

(u) "Declared pregnant woman" means a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of delivery.

(v) "Department" means the department of health and environment.

(w) "Depleted uranium" means source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. Depleted uranium shall not include special nuclear material.

(x) "Derived air concentration (DAC)" means the concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work, results in an intake of one ALI. For purposes of these regulations, the condition of light work is an inhalation rate of 1.2 cubic meters of air per hour for 2,000 hours in a year. DAC values are given in K.A.R. 28-35-233b appendix B, table I.

(y) "Derived air concentration-hour (DAC-hour)" means the product of the concentration of radioactive material in air, expressed as a fraction or multiple of the derived air concentration of each radionuclide, and the time of exposure to that radionuclide, in hours. A licensee or registrant may take 2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of 0.05 Sv (5 rem).

(z) "Dose" is a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, total organ dose equivalent, or total effective dose equivalent. For purposes of these regulations, "radiation dose" shall be considered an equivalent term.

(1) "Absorbed dose" means the energy imparted to matter by ionizing radiation per unit mass of irradiated material at the place of interest. The units of absorbed dose are the rad and the gray (Gy).

(2) "Collective dose" means the sum of the individual doses received in a given period of time by a specified population from exposure to a specified source of radiation.

(3) "Committed dose equivalent ($H_{T.50}$)" means the dose equivalent to organs or tissues of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

(4) ''Committed effective dose equivalent ($H_{E.50}$)'' is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to each of these organs or tissues ($H_{E.50} = \sum w_T H_{T.50}$).

(5) ''Deep dose equivalent (H_d),'' which applies to external whole body exposure, means the dose equivalent at a tissue depth of one centimenter (1000 mg/cm^2).

(6) ''Dose equivalent (H_T)'' means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the sievert (Sv) and rem.

(7) ''Dose limits'' means the permissible upper bounds of radiation doses established in accordance with these regulations. For purposes of these regulations, ''limits'' is an equivalent term.

(8) ''Effective dose equivalent (H_E)'' means the sum of the products of the dose equivalent to each organ or tissue (H_T) and the weighting factor (w_T) applicable to each of the body organs or tissues that are irradiated ($H_E = \sum w_T H_T$).

(9) ''Exposure'' means the quotient of dQ by dm. ''dQ'' is the absolute value of the total charge of the ions of one sign produced in air when all the electrons (negatrons and positrons) liberated by photons in a volume element of air having mass ''dm'' are completely stopped in air. [The special unit of exposure is the roentgen (R).] One roentgen equals 2.58×10^{-4} coulombs/kilogram of air.

(10) ''Exposure rate'' means the exposure per unit of time, such as R/min or mR/hr.

(11) ''External dose'' means that portion of the dose equivalent received from any source of radiation outside the body.

(12) ''Extremity dose'' means external dose equivalent to the hand, elbow, arm below the elbow, foot, knee, and leg below the knee.

(13) ''Eye dose equivalent'' means the external dose equivalent to the lens of the eye, at a tissue depth of 0.3 centimeter, or 300 mg/cm^2.

(14) ''Gray (Gy)'' means the SI unit of absorbed dose. One gray is equal to an absorbed dose of one joule per kilogram (100 rad).

(15) ''Internal dose'' means that portion of the dose equivalent received from radioactive material taken into the body.

(16) ''Occupational dose'' means the dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to sources of radiation, whether in the possession of the licensee, registrant, or other person. The term ''occupational dose'' shall not include any dose received:

(A) from background radiation;

(B) as a patient from medical practices;

(C) from voluntary participation in medical research programs; or

(D) as a member of the public.

(17) ''Public dose'' means the dose received by a member of the public from exposure to sources of radiation either within a licensee's or registrant's controlled area or in unrestricted areas. It shall not include occupational dose, dose received from background radiation, dose received as a patient from medical practices, or dose from voluntary participation in medical research programs.

(18) ''Quality factor (Q)'' means the modifying factor, listed in tables I and II in K.A.R. 28-35-144a that is used to derive dose equivalent from absorbed dose.

(19) ''Rad'' means the special unit of absorbed dose. One rad equals one hundredth of a joule per kilogram of material or the absorption of 100 ergs per gram of material. One millirad (mrad) equals 0.001 rad.

(20) ''Rem'' means the special unit of any of the quantities expressed as dose equivalent. One millirem (mrem) equals 0.001 rem.

(21) ''Shallow dose equivalent (H_S),'' which applies to the external exposure of the skin or an extremity, means the dose equivalent at a tissue depth of 0.007 centimeter, of 7 mg/cm^2 averaged over an area of one square centimeter.

(22) ''SI'' means the abbreviation for the international system of units.

(23) ''Sievert'' means the SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sievert is equal to the absorbed dose in gray multiplied by the quality factor (1 Sv = 100 rem).

(24) ''Total effective dose equivalent (TEDE)'' means the sum of the deep dose equivalent for external exposures and the committed effective dose equivalent for internal exposures.

(25) ''Total organ dose equivalent (TODE)'' means the sum of the deep dose equivalent and the committed dose equivalent to the organ receiving the highest dose as described in K.A.R. 28-35-212b of these regulations.

(aa) ''Dosimetry processor'' means an individual or an organization that processes and evaluates

individual monitoring devices in order to determine the radiation dose delivered to the monitoring devices.

(bb) ''Embryo/fetus'' means the developing human organism from conception until the time of birth.

(cc) ''Entrance or access point'' means any opening through which an individual or extremity of an individual could gain access to radiation areas or to licensed or registered radioactive materials. This includes entry or exit portals of sufficient size to permit human entry, irrespective of their intended use.

(dd) ''Explosive material'' means any chemical compound, mixture, or device which produces a substantial instantaneous release of gas and heat spontaneously or by contact with sparks or flame.

(ee) ''Generally applicable environmental radiation standards'' means standards issued by the U.S. environmental protection agency (EPA) under the authority of the atomic energy act of 1954, and amendments thereto, that impose limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment outside the boundaries of locations under the control of persons possessing or using radioactive material.

(ff) ''Half-life'' means the time required for any given radioisotope to decay to one-half of its original activity.

(gg) ''Hazardous waste'' means those wastes designated as hazardous by U.S. environmental protection agency regulations in 40 CFR part 261, effective July 1, 1991.

(hh) (1) ''Healing arts'' means the activities authorized by K.S.A. 65-2801 *et seq.*, and any amendments to those statutes.

(2) ''Dentistry'' means the activities authorized pursuant to K.S.A. 65-1421 *et seq.*, and any amendments to those statutes.

(3) ''Podiatry'' means the activities authorized pursuant to K.S.A. 65-2001 *et seq.*, and any amendments to those statutes.

(ii) ''Human use'' means the intentional internal or external administration of radiation or radioactive material to any individual.

(1) ''Misadministration'' means administration of:

(A) a radiopharmaceutical dosage greater than 30 microcuries of either I-125 or I-131 involving the wrong patient, or the wrong pharmaceutical, or when both the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage and the difference between the administered dosage and prescribed dosage exceeds 30 microcuries;

(B) a theraputic radiopharmaceutical dosage, other than I-125 or I-131 as sodium iodide, to the wrong patient, wrong route of administration or when the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage;

(C) a gamma stereotactic radiosurgery radiation dose to the wrong patient, the wrong treatment site, or a calculated total administered dose which differs from the total prescribed dose by more than 10 percent of the total prescribed dose;

(D) a teletherapy radiation dose to the wrong patient, or wrong treatment site, or a teletherapy radiation treatment in which:

(i) the treatment consists of three or fewer fractions and the calculated total administered dose differs from the total prescribed dose by more than 10 percent of the total prescribed dose; or

(ii) the calculated weekly administered dose is 30 percent greater than the weekly prescribed dose; or

(iii) the calculated total administered dose differs from the total prescribed dose by more than 20 percent of the total prescribed dose;

(E) a brachytherapy radiation dose:

(i) to the wrong patient;

(ii) to the wrong treatment site;

(iii) using the wrong radioisotope;

(iv) using a sealed source that is leaking;

(v) when for a temporary implant, one or more sealed sources are not removed upon completion of the procedure; or

(vi) when the calculated administered dose differs from the prescribed dose by more than 20 percent of the prescribed dose; or

(F) a diagnostic radiopharmaceutical dosage, other than quantities greater than 30 microcuries of either sodium iodide I-125 or I-131, or both:

(i) involving the wrong patient, wrong radiopharmaceutical, wrong route of administration, or when the administered dosage differs from the prescribed dosage; and

(ii) when the dose to the patient exceeds 5 rems dose equivalent to any individual organ.

(jj) ''Individual'' means any human being.

(kk) ''Individual monitoring'' means the assessment of:

(1) a dose equivalent by the use of individual monitoring devices or by the use of survey data; or

(2) a committed effective dose equivalent by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed, that is, DAC-hours.

(ll) ''Individual monitoring devices'' means devices designed to be worn by a single individual for the assessment of dose equivalent. For purposes of these regulations, ''personnel dosimeter'' and ''dosimeter'' shall be considered equivalent terms. Examples of individual monitoring devices are film badges, thermoluminescent dosimeters (TLDs), pocket ionization chambers, and personal air sampling devices.

(mm) ''Inspection'' means an official examination or observation that may include tests, surveys, and monitoring to determine compliance with rules, regulations, orders, requirements and conditions of the department.

(nn) ''Installation'' means the location where one or more sources of radiation are used, operated, or stored.

(oo) ''Interlock'' means a device for precluding access by an individual to an area of radiation hazard without warning, either by preventing admission, or by automatically removing the hazards.

(pp) ''License'' means a license issued pursuant to these regulations, except where otherwise specified.

(qq) ''Licensed or registered material'' means radioactive material received, possessed, used, transferred or disposed of under a general or specific license or registration issued by the department.

(rr) ''Licensee'' means any person who is licensed in accordance with these regulations and the act.

(ss) ''Licensing state'' means any state with regulations equivalent to the suggested state regulations for control of radiation relating to, and an effective program for, the regulatory control of NARM and which has been granted final designation by the conference of radiation control program directors, inc.

(tt) ''Lost or missing licensed or registered source of radiation'' means a licensed or registered source of radiation whose location is unknown. This definition shall include licensed or registered material that has been shipped but has not reached its planned destination and whose location cannot be readily traced in the transportation system.

(uu) ''Major processor'' means a user processing, handling, or manufacturing radioactive material exceeding type A quantities as unsealed sources or material, or exceeding four times type B quantities as sealed sources, but shall not include nuclear medicine programs, universities, industrial radiographers, or small industrial programs. Type A and B quantities are defined in K.A.R. 28-35-221b of these regulations.

(vv) ''Member of the public'' means an individual in a controlled or unrestricted area. However, an individual is not a member of the public during any period in which the individual receives an occupational dose.

(ww) ''Minor'' means an individual less than 18 years of age.

(xx) ''Monitoring'' means the measurement of radiation, radioactive material concentrations, surface area activities or quantities of radioactive material and the use of the results of these measurements to evaluate potential exposures and doses. For purposes of these regulations, ''radiation monitoring'' and ''radiation protection monitoring'' shall be considered equivalent terms.

(yy) ''NARM'' means any naturally occurring or accelerator-produced radioactive material. It shall not include byproduct, source, or special nuclear material.

(zz) ''Non-stochastic effect'' means a health effect, the severity of which varies with the dose and for which a threshold is believed to exist. Radiation-induced cataract formation is an example of a nonstochastic effect. For purposes of these regulations, ''deterministic effect'' shall be considered an equivalent term.

(aaa) ''Nuclear regulatory commission (NRC)'' means the U.S. nuclear regulatory commission or its duly authorized representatives.

(bbb) ''Package'' means the packaging together with its radioactive contents as presented for transport.

(ccc) ''Particle accelerator'' means any machine capable of accelerating electrons, protons, deuterons or other charged particles in a vacuum and of discharging the resultant particulate or other radiation into a medium at energies usually in excess of one MeV.

(ddd) ''Person'' means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, agency, political subdivision of this or any other state, or polit-

ical subdivision or agency thereof. The term shall also include any legal successor, representative, agent or agency of the foregoing, other than the United States nuclear regulatory commission, or any successor thereto, and other than federal government agencies licensed by the United States nuclear regulatory commission, or any successor thereto.

(eee) ''Personnel monitoring equipment'' means any device designed to be carried or worn by an individual and used to measure the exposure of that individual to radiation.

(fff) ''Pharmacist'' means any individual registered to practice pharmacy under K.S.A. 65-1626 *et seq.*, and any amendments to those statutes.

(ggg) ''Physician'' means any individual licensed to practice the healing arts pursuant to K.S.A. 65-2869 or 65-2870, or any amendments to these statutes.

(hhh) ''Planned special exposure'' means an infrequent exposure to radiation, separate from and in addition to the annual occupational dose limits.

(iii) ''Protective barrier'' means a barrier of attenuating materials used to reduce radiation exposure to the required degree.

(1) ''Primary protective barrier'' means a barrier of attenuating materials used to reduce the useful x-ray beam to the required degree.

(2) ''Secondary protective barrier'' means a barrier sufficient to attenuate stray radiation to the required degree.

(jjj) (1) ''Pyrophoric liquid'' means any liquid that ignites spontaneously in dry or moist air at or below 1307F (54.47C).

(2) A pyrophoric solid means any solid material, other than one classed as an explosive, which under normal conditions is liable to cause fires through friction, retained heat from manufacturing or processing, or which can be ignited readily and, when ignited, burns so vigorously and persistently as to create a serious transportation, handling, or disposal hazard.

(3) Spontaneously combustible and water-reactive materials shall be included in this definition.

(kkk) ''Qualified expert'' means, with reference to radiation protection, a person having the knowledge and training to measure ionizing radiation, to evaluate safety techniques, and to give advice regarding radiation protection needs. With reference to the calibration of radiation therapy equipment, it means a person having, in addition to the above qualifications, training and experience in the clinical applications of radiation physics to radiation therapy.

(lll) ''Radiation.''

(1) ''Ionizing radiation'' means gamma rays and x-rays, alpha and beta particles, high speed electrons, neutrons, and other nuclear particles;

(2) ''Nonionizing radiation'' means sound or radio waves, or visible, infrared, or ultra-violet light.

(mmm) ''Radiation safety officer'' means a person directly responsible for radiation protection.

(nnn) ''Radioactivity'' means the disintegration of unstable atomic nuclei by the emission of radiation.

(ooo) ''Radiographer'' means any individual who:

(1) performs non-medical radiographic operations or who, in attendance at the site where those radiographic operations are being performed, personally supervises the operations; and

(2) is responsible to the licensee or registrant or both for assuring compliance with the requirements of regulations or the conditions of the license, including any specific authorization by the department to provide training to radiographic trainees.

(ppp) ''Radiographer's trainee'' means any individual who, under the personal supervision of a radiographer, uses radiation machines, radiographic exposure devices, sealed sources, or related handling tools or survey instruments, in industrial radiography.

(qqq) Radiographic devices.

(1) ''Radiographic exposure device'' means any instrument with a sealed source fastened or contained in the instrument in which the sealed source or shielding of the source may be moved or otherwise changed from a shielded to unshielded position for purposes of making a radiographic exposure.

(2) ''Source changer'' means a device designed and used for replacement of sealed sources in radiographic exposure devices, including those also used for transporting and storage of sealed sources.

(3) ''Shielded position'' means the location within the radiographic exposure device or storage container which, by manufacturer's design, is the proper location for storage of the sealed source.

(rrr) Non-medical radiography.

(1) ''Industrial radiography'' means the examination of the macroscopic structure of materials by nondestructive methods utilizing sources of radiation.

(2) ''Cabinet radiography using radiation machines'' means industrial radiography, using radiation machines, that is conducted in an enclosed, interlocked cabinet which prevents the radiation machine from operating unless all openings are securely closed, and is sufficiently shielded so that every location on the cabinet's exterior meets conditions for an unrestricted area as specified in K.A.R. 28-35-214, and any amendment to that rule and regulation.

(A) ''Cabinet x-ray system'' means an x-ray system with the x-ray tube installed in an enclosure, termed a ''cabinet,'' which, independent from existing architectural structures except the floor on which it may be placed, is intended to contain at least that portion of a material being irradiated, provide radiation attenuation, and exclude personnel from its interior during generation of x-rays. Cabinet x-ray systems may include all x-ray systems designed primarily for the inspection of carry-on baggage at airline, railroad, and bus terminals, and in similar facilities. An x-ray tube used within a shielded part of a building, or x-ray equipment which may temporarily or occasionally incorporate portable shielding, shall not be considered a cabinet x-ray system.

(B) ''Certified cabinet x-ray system'' means a cabinet x-ray system which has been certified in accordance with 21 CFR 1010.2, as in effect in July 1980 as being manufactured and assembled pursuant to the provisions of 21 CFR 1020.40.

(3) ''Shielded room radiography using radiation machines'' means industrial radiography using radiation machines which is:

(A) conducted in an enclosed room, the interior of which is not occupied during radiographic operations;

(B) so shielded that every location on the exterior meets conditions for an unrestricted area as specified in K.A.R. 28-35-214, and any amendment to that rule and regulation; and

(C) only accessible through openings which are interlocked so that the radiation machine will not operate unless all openings are securely closed.

(4) ''Permanent radiographic installation'' means a shielded installation or structure designed or intended for radiography and in which radiography is regularly performed.

(5) ''Storage area'' means any location, facility, or vehicle which is used to store, to transport, or to secure a radiographic exposure device, a storage container, or a sealed source when it is not in use and which is locked or has a physical barrier to prevent accidental exposure, tampering with, or unauthorized removal of the device, container, or source.

(sss) ''Reference man'' means a hypothetical aggregation of human physical and physiological characteristics determined by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base. A description of the reference man is contained in the international commission on radiological protection report, ICRP Publication 23, ''Report of the Task Group on Reference Man.''

(ttt) ''Registrable item'' means any radiation machine as defined in paragraph (cccc)(2) of this regulation.

(uuu) ''Registrant'' means any person who is registered with the department and is legally obligated to register with the department pursuant to these regulations and the act.

(vvv) ''Registration'' means completing and filing forms with the department as required by these regulations.

(www) ''Regulations of the U.S. department of transportation'' means the regulations in 49 CFR Parts 100-189, as in effect on December 31, 1982.

(xxx) ''Research and development'' means:

(1) theoretical analysis, exploration, or experimentation; or

(2) the extension of investigative findings and theories of a scientific or technical nature into practical application for experimental purposes, including the experimental production and testing of models, devices, equipment, materials, and processes. Research and development, as used in these regulations, shall not include the internal or external administration of radiation or radioactive materials to any individual.

(yyy) ''Respiratory protective equipment'' means an apparatus, such as a respirator, used to reduce an individual's intake of airborne radioactive materials.

(zzz) ''Sanitary sewerage'' means a system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee or registrant.

(aaaa) ''Sealed source'' means any radioactive material that is permanently encased in a container or matrix designed to prevent the leakage or escape of the radioactive material under foreseeable conditions of use and wear.

(bbbb) "Secretary" means the secretary of the department of health and environment.

(cccc) "Source of radiation" means any material, device, or equipment emitting, or capable of producing radiation.

(1) "Radioactive material" means any material, in any chemical or physical form, which emits radiation spontaneously.

(A) "By-product material" means:

(i) any radioactive material, except special nuclear material, yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material; and

(ii) the tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium or thorium solution extraction processes. Underground ore bodies depleted by these solution extraction operations shall not constitute "byproduct material" within this definition.

(B) "Source material" means:

(i) uranium or thorium, or any combination thereof, in any physical or chemical form; or

(ii) ores which contain, by weight, 0.05 percent or more of uranium, thorium or any combination thereof.

The term "source material," as used in these regulations, shall not include special nuclear material.

(C) "Special nuclear material" means:

(i) plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the department declares by order to be special nuclear material after the U.S. nuclear regulatory commission, pursuant to the provisions of section 51 of the atomic energy act of 1954, as amended, determines it to be special nuclear material, but shall not include source material; or

(ii) any material artificially enriched by any of the foregoing, but shall not include source material.

(D) "Special nuclear material in quantities not sufficient to form a critical mass" means:

(i) uranium enriched in the isotope U-235 in quantities not exceeding 350 grams of contained U-235;

(ii) uranium enriched in the isotope uranium-233 in quantities not exceeding 200 grams of contained U-233;

(iii) plutonium not exceeding 200 grams; or

(iv) any combination of these special nuclear materials in accordance with the following formula:

$$\frac{\text{grams of contained U-235}}{350} + \frac{\text{grams of contained U-233}}{200} + \frac{\text{gram of Pu}}{200} \leq 1$$

The sum of the ratios for all of the kinds of special nuclear material in combination shall not exceed "1" (i.e. unity).

(E) "Natural radioactivity" means radioactivity of naturally occurring nuclides.

(2) "Radiation machine" means:

(A) any device which is primarily intended to produce, and is capable of producing, ionizing radiation as defined in K.A.R. 28-35-135(lll) of this regulation; or

(B) any device which is not primarily intended to, but does, produce ionizing radiation at a level greater than 0.5 mR/hr at any point five centimeters from its surface. Radiation machine shall not mean any device which produces ionizing radiation only by use of radioactive materials.

(dddd) "Special form" means any licensed material within any transport group which:

(1) (A) is in solid form;

(B) has no dimension less than 0.5 millimeter or at least one dimension greater than five millimeters;

(C) does not melt, sublime, or ignite in air at a temperature of 1,000°F;

(D) does not shatter or crumble if subjected to the percussion test described in K.A.R. 28-35-144, appendix B of this part; and

(E) is not dissolved or converted into dispersible form to the extent of more than 0.005 percent by weight by immersion for one week in water at 68°F. or in air at 86°F.; or

(2) (A) is in any physical form securely contained in a capsule;

(B) has no dimension less than 0.5 millimeter or at least one dimension greater than five millimeters;

(C) will retain its contents if subjected to the tests prescribed in K.A.R. 28-35-144, appendix B of this part; and

(D) is constructed of materials which do not melt, sublime, or ignite in air at 1,475°F., and do not dissolve or convert into dispersible form to the extent of more than 0.005 percent by weight by

immersion for one week in water at 68°F. or in air at 86°F.

(eeee) "Source material milling" means any activity that results in the production of byproduct material as defined by K.A.R. 28-35-135 (cccc)(1)(A)(ii).

(ffff) "Stochastic effect" means a health effect that occurs randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer incidence are examples of stochastic effects. For purposes of these regulations, "probabilistic effect" shall be considered an equivalent term.

(gggg) "Storage container" means a device in which radioactive materials are transported or stored.

(hhhh) "Stray radiation" means the sum of leakage and scattered radiation.

(1) "Leakage radiation" means all radiation, except the useful beam, coming from within the source housing.

(2) "Scattered radiation" means radiation that, during passage through matter, has been deviated in direction.

(iiii) "Subsurface studies" means of or relating to evaluation of parameters below the surface of the earth.

(1) "Field station" means a facility where radioactive sources may be stored or used and from which equipment is dispatched to temporary job sites.

(2) "Injection tool" means a device used for controlled subsurface injection of radioactive tracer material.

(3) "Logging supervisor" means the individual who uses sources of radiation or provides personal supervision of the utilization of sources of radiation at the well site.

(4) "Logging tool" means a device used subsurface to perform well-logging.

(5) "Mineral logging" means any logging performed for the purpose of mineral exploration other than oil or gas.

(6) "Personal supervision" means guidance and instruction by the supervisor who is physically present at the job site and watching the performance of the operation in such proximity that contact can be maintained and immediate assistance given as required.

(7) "Radioactive marker" means radioactive material placed subsurface or on a structure intended for subsurface use for the purpose of depth determination or direction orientation.

(8) "Source holder" means a housing or assembly into which a radioactive source is placed for the purpose of facilitating the handling and use of the source in well-logging operations.

(9) "Subsurface tracer study" means the release of a substance tagged with radioactive material for the purpose of tracing the movement or position of the tagged substance in the well-bore or adjacent formation.

(10) "Temporary job site" means a location where radioactive materials are present to perform wireline service operations or subsurface tracer studies.

(11) "Well-bore" means a drilled hole in which wireline service operations and subsurface tracer studies are performed.

(12) "Well-logging" means the lowering and raising of measuring devices or tools which may contain sources of radiation into well-bores or cavities for the purpose of obtaining information about the well or adjacent formations.

(13) "Wireline" means a cable containing one or more electrical conductors which is used to lower and raise logging tools in the well-bore.

(14) "Wireline service operation" means any evaluation or mechanical service which is performed in the well-bore using devices on a wireline.

(jjjj) "Survey" means an evaluation of the radiation hazard incident to the production, use, transfer, release, disposal, or presence of sources of radiation. When appropriate, this evaluation includes a physical survey of the location of materials or equipment or both and measurements of levels of radiation or concentrations of radioactive materials present.

(kkkk) "Test" means the process of verifying compliance with an applicable regulation.

(llll) "These regulations" mean K.A.R. 28-35-133 to 28-35-364, inclusive, and any amendments to those regulations.

(mmmm) "Transport index" means the dimensionless number, rounded up to the first decimal place, placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is the maximum radiation level in millirem per hour at one meter from the external surface of the package.

(nnnn) "U.S. department of energy" means the department of energy established by public law

95-91, August 4, 1977, 91 Stat. 565, 42 U.S.C. 7101 *et seq.*, to the extent that the department exercises functions formerly vested in the U.S. atomic energy commission, its chairman, members, officers and components and transferred to the U.S. energy research and development administrator and to the administrator thereof pursuant to sections 104(b), (e) and (d) of the energy reorganization act of 1974, public law 93-438, October 11, 1974, 88 Stat. 1233 at 1237, effective January 19, 1975, and retransferred to the secretary of energy pursuant to section 301(a) of the department of energy organization act, public law 95-91, August 4, 1977, 91 Stat. 565 at 577-578, 42 U.S.C. 7151, effective October 1, 1977.

(oooo) "Unrefined and unprocessed ore" means ore in its natural form prior to any processing, including grinding, roasting, beneficiating, or refining.

(pppp) "Useful beam" means that part of the radiation which passes through a window, aperture, cone, or other collimating device.

(qqqq) "Waste" means those low-level radioactive wastes that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level waste shall have the same meaning as in the low-level radioactive waste policy act, P.L. 96-573, as amended by P.L. 99-240, effective January 15, 1986; that is, radioactive waste:

(1) not classified as high-level radioactive waste, spent nuclear fuel, or byproduct material as defined in section 11e.(2) of the atomic energy act, uranium or thorium tailings and waste; and

(2) classified as low-level radioactive waste consistent with existing law and in accordance with (1) by the U.S. nuclear regulatory commission.

(rrrr) "Waste handling licensees" means persons licensed to receive and store radioactive wastes prior to disposal or persons licensed to dispose of radioactive waste or persons licensed to both receive and store prior to disposal and dispose of radioactive waste.

(ssss) "Week" means seven consecutive days starting on Sunday.

(tttt) "Weighting factor (w_T) for an organ or tissue (T)" means the proportion of the risk of stochastic effects resulting from irradiation of that organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly. For calculating the effective dose equivalent, the values of w_T shall be as follows:

ORGAN DOSE WEIGHTING FACTORS

Organ or Tissue	w_T
Gonads	0.25
Breast	0.15
Red bone marrow	0.12
Lung	0.12
Thyroid	0.03
Bone surfaces	0.03
Remainder	0.30[a]
Whole Body	1.00[b]

[a] 0.30 results from 0.06 for each of 5 "remainder" organs, excluding the skin and the lens of the eye, that receive the highest doses.

[b] For the purpose of weighting the external whole body dose, for adding it to the internal dose, a single weighting factor, $w_T = 1.0$, has been specified. The use of other weighting factors for external exposure will be approved on a case-by-case basis until such time as specific guidance is issued.

(uuuu) "Whole body," means, for purposes of external exposure, the head, trunk, including the male gonads and shall apply to arms above the elbow, or legs above the knee.

(vvvv) "Worker" means an individual engaged in work under a license or registration or both issued by the department and controlled by a licensee or registrant or both. Worker shall not include any licensee or registrant.

(wwww) "Working level (WL)" means any combination of short-lived radon daughters in one liter of air that will result in the ultimate emission of 1.3E1 5 MeV of potential alpha particle energy. The short-lived radon daughters are:

(1) for radon-222:
(A) polonium-218;
(B) lead-214;
(C) bismuth-214; and
(D) polonium-214; and
(2) for radon-220:
(A) polonium-216;
(B) lead-212;
(C) bismuth-212; and
(D) polonium-212.

(xxxx) "Working level month (WLM)" means an exposure to one working level for 170 hours or for 2,000 working hours per year.

(yyyy) "Year" means the period of time beginning in January used to determine compliance with the provisions of these regulations. The licensee or registrant may change the starting date of the year used to determine compliance by the licensee or registrant provided that the change is made at the beginning of the year and that no day is omitted or duplicated in consecutive years.

(zzzz) X-ray equipment standard definitions.

(1) ''Accessible surface'' means the external surface of the enclosure or housing provided by the manufacturer.

(2) ''Added filter'' means the filter added to the inherent filtration.

(3) ''Aluminum equivalent'' means the thickness of aluminum (type 1100 alloy) affording the same attenuation, under specified conditions, as the material in question. The nominal chemical composition of type 1100 aluminum alloy is 99.00 percent minimum aluminum, 0.12 percent copper.

(4) ''Applicator'' means a structure which determines the extent of the treatment field at a given distance from the virtual source.

(5) ''Attenuation block'' means a block or stack, having dimensions of 20 cm by 20 cm by 3.8 cm, of type 1100 aluminum alloy or other materials having equivalent attenuation.

(6) ''Automatic exposure control'' means a device which automatically controls one or more technique factors in order to obtain, at a preselected location or locations, a required quantity of radiation. (See also ''Phototimer.'')

(7) ''Beam axis'' means a line from the source through the centers of the x-ray fields.

(8) ''Beam-limiting device'' means a device which provides a means to restrict the dimensions of the x-ray field.

(9) ''Beam monitoring system'' means a system designed to detect and measure the radiation present in the useful beam.

(10) ''Beam monitoring filter'' means a filter used in order to scatter a beam of electrons.

(11) ''Central axis of the beam'' means a line passing through the virtual source and the center of the plane figure formed by the edge of the first beam-limiting device.

(12) ''Certified components'' means components of x-ray systems which are subject to regulations promulgated under public law 90-602, the radiation control for health and safety act of 1968 and amendments thereto in effect July 1980.

(13) ''Certified system'' means any x-ray system which has one or more certified component or components.

(14) ''Changeable filters'' means any filter, exclusive of inherent filtration, which can be removed from the useful beam through any electronic, mechanical or physical process.

(15) ''Coefficient of variation'' or ''C'' means the ratio of the standard deviation to the mean value of a population of observations. It is estimated using the following equation:

$$C = \frac{S}{\bar{X}} = \frac{1}{\bar{X}} \left(\sum_{i-1}^{n} \frac{(x_i - \bar{x})^2}{n-1} \right)^{1/2}$$

where

s = Estimated standard deviation of the population.

x = Mean value of observations in sample.

x_i = ith observation in sample

(16) ''Cooling curve'' means the graphical relationship between heat units stored and cooling time.

(17) ''Contact therapy'' means that the x-ray tube port is put in contact with, or within five centimeters of, the surface being treated.

(18) ''Control panel'' means that part of the x-ray control upon which are mounted the switches, knobs, pushbuttons, and other hardware necessary for manually setting the technique factors.

(19) ''Deadman switch'' means a switch constructed so that circuit closing can be maintained only by continuous pressure by the operator.

(20) ''Diagnostic source assembly'' means the tube housing assembly with a beam-limiting device attached.

(21) ''Diagnostic-type tube housing'' means an x-ray tube housing constructed so that the leakage radiation, at a distance of one meter from the target, does not exceed 100 milliroentgens in one hour when the tube is operated at the maximum rate of continuous tube current and the maximum rate of tube potential.

(22) ''Diagnostic x-ray system'' means an x-ray system designed for irradiation of any part of the human body for the purpose of diagnosis or visualization.

(23) ''Direct scattered radiation'' means that scattered radiation which has been deviated in direction only by materials irradiated by the useful beam. See ''scattered radiation,'' K.A.R. 28-35-135 (hhhh)(2).

(24) ''Dose monitoring system'' means a system of devices for the detection, measurement, and display of quantities of radiation.

(25) ''Dose monitor unit'' means a unit response from the dose monitoring system from which the absorbed dose can be calculated.

(26) ''Entrance exposure rate'' means the roentgens per unit time at the point where the center of the useful beam enters any individual.

(27) ''Existing equipment'' means therapy systems subject to K.A.R. 28-35-250a which were manufactured on or before January 1, 1985.

(28) ''Field emission equipment'' means equipment that uses an x-ray tube in which electron emission from the cathode is due solely to the action of an electric field.

(29) ''Field-flattening filter'' means a filter used to provide dose uniformity over the area of a useful beam of x-rays at a specified depth.

(30) ''Field size'' means the dimensions along the major axes of an area in a plane perpendicular to the specified direction of the beam of incident radiation at the normal treatment distance, and is defined by the intersection of the major axes and the 50 percent isodose line. Material shall be placed in the beam so that the maximum dose is produced at the normal treatment distance when field size is being determined.

(31) ''Filter'' means material placed in the path of the useful beam of x-rays to absorb, preferentially, the less penetrating radiations.

(32) ''Fluoroscopic imaging assembly'' means a component which comprises a reception system in which x-ray photons produce a fluoroscopic image. It includes equipment housings, any electrical interlocks, the primary protective barrier, and structural material providing linkage between the image receptor and the diagnostic source assembly.

(33) ''Focal spot'' means the area projected on the anode of the x-ray tube by the electrons accelerated from the cathode and from which the useful beam originates.

(34) ''Gantry'' means that part of the system supporting and allowing possible movements of the radiation head.

(35) ''General purpose radiographic x-ray system'' means any radiographic x-ray system which, by design, is not limited to radiographic examination of specific anatomical regions.

(36) ''Gonadal shield'' means a protective barrier for the testes or ovaries.

(37) ''Half-value layer (HVL)'' means the thickness of specified material which attenuates the beam of extent that the exposure rate is reduced to one half of its original value. The contribution of all scattered radiation, other than any which might be present initially in the beam concerned, shall be excluded from this definition.

(38) ''Healing arts screening'' means the testing of human beings using x-ray machines for the detection or evaluation of health indications when such tests are not specifically and individually ordered by a licensed practitioner of the healing arts legally authorized to prescribe such x-ray tests for the purpose of diagnosis or treatment.

(39) ''Heat unit'' means a unit of energy equal to the product of the peak kilovoltage, milliamperes, and seconds, i.e., kVp 2 mA 2 second.

(40) ''Image intensifier'' means a device which converts, instantaneously by means of photoemissive surfaces and electronic circuiting, an x-ray pattern into a light pattern of greater intensity than would have been provided by the original x-ray pattern.

(41) ''Image receptor'' means any device, such as a fluorescent screen or radiographic film, which transforms incident x-ray photons into a visible image or into another form which can be made into a visible image by further transformations.

(42) ''Image receptor support'' means, for mammographic systems, that part of the system designed to support the image receptor in a horizontal plane during a mammographic examination.

(43) ''Inherent filtration'' means the filtration permanently in the useful beam including the window of the x-ray tube and any permanent tube or source enclosure.

(44) ''Interruption of irradiation'' means the stopping of irradiation with the possibility of continuing irradiation without resetting of operating conditions at the control panel.

(45) ''Irradiation'' means the exposure of matter to ionizing radiation.

(46) ''Isocenter'' means a fixed point in space located at the center of the smallest sphere through which the central axis of the beams passes in all conditions.

(47) ''Kilovolts peak (kVp)'' means the same as ''peak tube potential.''

(48) ''kV'' means kilovolts.

(49) ''kWs'' means kilowatt second. It is equivalent to 103 kV.mA.s, i.e.,

$$\text{kWs} = (X)\text{kV}^2 \ (Y)\text{mA} \ (Z)\text{s} \qquad \frac{\text{kWs}}{10^3 \text{kV}^2 \ \text{mA} \ \text{s}} = \frac{XYZ \text{ kW}}{10^3}$$

(50) ''Lead equivalent'' means the thickness of leads affording the same attenuation, under specified conditions, as the material in question.

(51) ''Leakage radiation'' means radiation emanating from the diagnostic or therapeutic source assembly except for:

(A) the useful beam; and

(B) radiation produced when the exposure switch or timer is not activated.

(52) ''Leakage technique factors'' means the technique factors associated with the tube housing assembly which are used in measuring leakage radiation. The leakage technique factors shall be defined as follows:

(A) for diagnostic source assemblies intended for capacitor energy storage equipment, the maximum rated number of exposures in an hour for operation at the maximum rated peak tube potential, with the quantity of charge per exposure being 10 millicoulombs (mAs) or the minimum obtainable from the unit, whichever is larger;

(B) for diagnostic source assemblies intended for field emission equipment rated for pulsed operation, the maximum rated number of x-ray pulses in an hour for operation at the maximum rated peak tube potential; and

(C) for all other diagnostic or therapeutic source assemblies, the maximum rated peak tube potential and the maximum rated continuous tube current for the maximum rated peak tube potential.

(53) ''Light field'' means that area of the intersection of the light beam from the beam-limiting device and one of the set of planes parallel to and including the plane of the image receptor, whose perimeter is the locus of points at which the illumination is one-fourth of the maximum in the intersection.

(54) ''Line-voltage regulation'' means the difference between the no-load and the load line potentials expressed as a percent of the load line potential. It is calculated using the following equation:

Percent line-voltage regulation = $100 (V_n - V_1)/V_1$
where
V_n = No-load line potential and
V_1 = Load line potential.

(55) ''mA'' means milliampere.

(56) ''mAs'' means milliampere second.

(57) ''Maximum line current'' means the root-mean-square current in the supply line of an x-ray machine operating at its maximum rating.

(58) ''Moving beam therapy'' means radiation therapy with relative displacement of the useful beam and the patient during irradiation. It includes arc therapy, skip therapy, and rotational therapy.

(59) ''New equipment'' means systems subject to K.A.R. 28-35-249 which were manufactured after January 1, 1985.

(60) ''Normal treatment distance'' means:

(A) for electron irradiation, the virtual source to surface distance along the central axis of the useful beam as specified by the manufacturer for the applicator; or

(B) for x-ray irradiation, the virtual source to isocenter distance along the central axis of the useful beam. For non-isocentric equipment, this distance shall be that specified by the manufacturer.

(61) ''Patient'' means an individual subjected to healing arts examination, diagnosis, or treatment.

(62) ''Peak tube potential'' means the maximum value of the potential differences across the x-ray tube during an exposure.

(63) ''Phantom'' means a volume of material behaving in a manner similar to tissue with respect to the attenuation and scattering of radiation.

(64) ''Phototimer'' means a method for controlling radiation exposures to image receptors by limiting the amount of radiation which reaches a radiation monitoring device or devices. The radiation monitoring device or devices are part of an electronic circuit which controls the duration of time the tube is activated. (See also ''Automatic exposure control.'')

(65) ''Position indicating device (PID)'' means a device on dental x-ray equipment used to indicate the beam position and to establish a definite source to skin surface distance. It may or may not incorporate or serve as a beam-limiting device.

(66) ''Primary dose monitoring system'' means a system which will monitor the useful beam during irradiation and which will terminate irradiation when a pre-selected number of dose monitor units have been acquired.

(67) ''Protective apron'' means an apron made of radiation-absorbing materials, used to reduce radiation exposure.

(68) ''Protective glove'' means a glove made of radiation-absorbing materials used to reduce radiation exposure.

(69) ''Radiation detector'' means a device which in the presence of radiation provides a signal or other indication suitable for use in measuring one or more quantities of incident radiation.

(70) ''Radiation head'' means the structure from which the useful beam emerges.

(71) ''Radiation therapy simulation system'' means a radiographic or fluoroscopic x-ray system intended for localizing the volume to be exposed during radiation therapy and confirming the position and size of the therapeutic irradiation field.

(72) ''Radiograph'' means an image receptor on which the image is created directly or indirectly by an x-ray pattern, which results in a permanent record.

(73) ''Radiographic imaging system'' means any system whereby a permanent or semi-permanent image is recorded on an image receptor by the action of ionizing radiation.

(74) ''Radiological physicist'' means an individual who:

(A) is certified by the American board of radiology in therapeutic radiological physics, radiological physics, or x-and gamma-ray physics;

(B) (i) has a bachelor's degree in one of the physical sciences or engineering; and

(ii) has three years of full-time experience working in therapeutic radiological physics under the direction of a physicist certified by the American board of radiology, with work duties involving the calibration and spot checks of a medical accelerator or a sealed source tele-therapy unit; or

(C) (i) has a master's or a doctor's degree in physics, biophysics, radiological physics, health physics, or engineering;

(ii) has had one year of full-time training in therapeutic radiological physics; and

(iii) has had one year of full-time work experience in a radiotherapy facility where the individual's duties involve calibration and spot checks of a medical accelerator or a sealed source teletherapy unit.

(75) ''Rating'' means the operating limits as specified by the component manufacturer.

(76) ''Recording'' means producing a permanent form of an image resulting from x-ray photons such as film or videotape.

(77) ''Response time'' means the time required for an instrument system to reach 90 percent of its final reading when the radiation-sensitive volume of the instrument system is exposed to a step change in radiation flux from zero to a level sufficient to provide a steady state midscale reading.

(78) ''Secondary dose monitoring system'' means a system which will terminate irradiation if the primary system fails.

(79) ''Shadow tray'' means a device attached to the radiation head to support auxiliary beam-limiting material.

(80) ''Shutter'' means a device, generally of lead, attached to an x-ray tube housing assembly which can totally intercept the useful beam and which has a lead equivalency not less than that of the tube housing assembly.

(81) ''Source'' means the focal spot of the x-ray tube.

(82) ''Source-image receptor distance (SID)'' means the distance from the source to the center of the input surface of the image receptor.

(83) ''Spot check'' means a procedure which is performed to assure that a previous calibration continues to be valid.

(84) ''Spot film'' means a radiograph which is made during a fluoroscopic examination to permanently record conditions which exist during that fluoroscopic procedure.

(85) ''Spot-film device'' means a device intended to either transport and position a radiographic image receptor between the x-ray source and fluoroscopic image receptor or intended to position a radiographic image receptor between the x-ray source and fluoroscopic image receptor. It includes a device intended to hold a cassette over the input end of an image intensifier for the purpose of making a radiograph.

(86) ''SSD'' means the distance between the source and the skin of the patient.

(87) ''Stationary beam therapy'' means radiation therapy without relative displacement of the useful beam and the patient during irradiation.

(88) ''Target'' means that part of a radiation head which by design intercepts a beam of accelerated particles with subsequent emission of other radiation.

(89) ''Technique factors'' means the conditions of operation. They are specified as follows:

(A) for capacitor energy storage equipment, peak tube potential in kV and quantity of charge in mAs;

(B) for field emission equipment rated for pulsed operation, peak tube potential in kV and number of x-ray pulses; and

(C) for all other equipment, peak tube potential in kV and either tube current in mA and exposure time in seconds, or the product of tube current and exposure time in mAs.

(90) ''Termination of irradiation'' means the stopping of irradiation in a fashion which will not permit continuance of irradiation without the resetting of operating conditions at the control panel.

(91) ''Therapeutic-type tube housing'' means:

(A) for x-ray equipment not capable of operating at 500 kVp or above, an x-ray tube housing so constructed that the leakage radiation, at a distance of one meter from the source, does not exceed one roentgen in an hour when the tube is

operated at its maximum rated continuous current for the maximum rated tube potential; and

(B) for x-ray equipment capable of operating at 500 kVp or above, an x-ray tube housing so constructed that the leakage radiation, at a distance of one meter from the source, does not exceed 0.1 percent of the useful beam dose rate at one meter from the source for any of its operating conditions.

Areas of reduced protection shall be acceptable if the average reading over any 100 cm^2 area, at one meter distance from the source, does not exceed the values given in paragraphs (A) or (B), above.

(92) ''Traceable to a national standard'' means that a quantity or a measurement has been compared to a national standard directly or indirectly through one or more intermediate steps and that all comparisons have been documented.

(93) ''Tube'' means an x-ray tube, unless otherwise specified.

(94) ''Tube housing assembly'' means the tube housing with tube installed. It includes high-voltage or filament transformers or both and other appropriate elements when they are contained within the tube housing.

(95) ''Tube rating chart'' means the set of curves which specify the rated limits of operation of the tube in terms of the technique factors.

(96) ''Variable-aperture beam-limiting device'' means a beam-limiting device which has capacity for stepless adjustment of the x-ray field size at a given SID.

(97) ''Visible area'' means that portion of the input surface of the image receptor over which incident x-ray photons produce a visible image.

(98) ''Virtual source'' means a point from which radiation appears to originate.

(99) ''Wedge filter'' means an added filter effecting continuous progressive attenuation of all or part of the useful beam.

(100) X-ray, analytical.

(A) ''Analytical x-ray equipment'' means equipment used for x-ray diffraction or fluorescence analysis.

(B) ''Analytical x-ray system'' means a group of local and remote components utilizing x-rays to determine the elemental composition, or to examine the microstructure, of materials. ''Local components'' include those components that are struck by x-rays, including radiation source housings, port, and shutter assemblies, collimators, sample holders, cameras, goniometers, detectors and shielding. ''Remote components'' include power supplies, transformers, amplifiers, readout devices, and control panels.

(C) ''Fail-safe characteristics'' means a design feature which causes beam port shutters to close, or otherwise prevents emergence of the primary beam, upon the failure of a safety or warning device.

(D) ''Normal operating procedures'' mean operating procedures for conditions suitable for analytical purposes with shielding and barriers in place. These shall not include maintenance procedures, but shall include routine alignment procedures. Routine and emergency radiation safety considerations shall be considered part of these procedures.

(E) ''Open-beam configuration'' means an analytical x-ray system in which an individual could accidentally place some part of the individual's body in the primary beam path during normal operation.

(F) ''Primary beam'' means ionizing radiation which passes through an aperture of the source housing by a direct path from the x-ray tube or a radioactive source located in the radiation source housing.

(101) ''X-ray control'' means a device which controls input power to the x-ray high-voltage generator or the x-ray tube. It includes timers, phototimers, automatic brightness stabilizers, and similar devices which control the technique factors of an x-ray exposure.

(102) ''X-ray equipment'' means an x-ray system, subsystem, or component thereof, which may be either mobile, stationary, or portable.

(A) ''Mobile x-ray equipment'' means x-ray equipment mounted on a permanent base with wheels or casters or both for moving while completely assembled.

(B) ''Stationary x-ray equipment'' means x-ray equipment which is installed in a fixed location.

(C) ''Portable x-ray equipment'' means x-ray equipment designed to be hand-carried.

(103) ''X-ray field'' means that area of the intersection of the useful beam and any one of the set of planes parallel to and including the plane of the image receptor, whose perimeter, as established by the beam limiting device, is the locus of points at which the exposure rate is one-fourth of the maximum in the intersection.

(104) ''X-ray high-voltage generator'' means a device which transforms electrical energy from the potential supplied by the x-ray control to the tube operating potential. The device may also in-

clude means for transforming alternating current to direct current, filament transformers for the x-ray tube or tubes, high voltage switches, electrical protective devices, and other appropriate elements.

(105) "X-ray system" means an assemblage of components for the controlled production of x-rays. It shall include, at a minimum, an x-ray high-voltage generator, an x-ray control, a tube housing assembly, a beam-limiting device, and supporting structures. Additional components which function with the system shall be considered integral parts of the system.

(106) "X-ray tube" means any electron tube which is designed for the conversion of electrical energy into x-ray energy. (Authorized by K.S.A. 1992 Supp. 48-1607; implementing K.S.A. 1993 Supp. 48-1603, 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-136. **Communications.** All communications concerning these regulations shall be addressed to:

Department of Health & Environment
Bureau of Air Quality and Radiation Control
Attention: Radiation Control
Topeka, Kansas 66620

(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-137. **Records.** Each licensee or registrant shall keep records showing the receipt, transfer, and disposal of all sources of radiation, and any other records specifically required by these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-138. **Inspections.** (a) Each licensee or registrant shall afford, at all reasonable times, the secretary or the secretary's duly authorized representative the opportunity to inspect sources of radiation and the premises and installations in which such sources of radiation are used or stored.

(b) Each licensee or registrant, upon reasonable notice, shall make available, for inspection by the secretary or the secretary's duly authorized representative records maintained pursuant to these regulations. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1607, 48-1609; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-139. **Testing and surveys.** (a) Each licensee or registrant shall make, or cause to be made, those surveys that are necessary for the licensee or registrant to comply with these regulations.

(b) Each licensee or registrant shall perform, upon instructions from the department, or shall permit the department to perform, such reasonable tests as the department deems appropriate or necessary, including, but not limited to, tests of:

(1) Sources of radiation;

(2) installations in which sources of radiation are used or stored;

(3) radiation detection and monitoring instruments; and

(4) other equipment and devices employed during use or storage of licensed or registered sources of radiation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-140. **Exemptions.** (a) *General provision.* The secretary, upon application for an exemption or upon the secretary's own initiative, may grant exemptions or exceptions from the requirements of these regulations, if it is determined that the exemption will not result in an undue hazard to public health and safety, or to property.

(b) *Carriers.* Common and contract carriers, freight forwarders, and warehousemen, who are subject to the rules and regulations of the U.S. department of transportation or the U.S. postal service (39 CFR Parts 14 and 15), shall be exempt from these regulations to the extent that they transport or store sources of radiation in the regular course of their carriage for another. Private carriers who are subject to the rules and regulations of the U.S. department of transportation shall be exempt from these regulations to the extent that they transport sources of radiation. Common, contract, and private carriers who are not subject to the rules and regulations of the U.S. department of transportation or the U.S. postal service shall be subject to applicable sections of these regulations.

(c) *U.S. department of energy contractors and U.S. nuclear regulatory commission contractors.*

Any U.S. department of energy contractor or subcontractor and any U.S. nuclear regulatory commission contractor or subcontractor operating within this state shall be exempt from these regulations to the extent that the contractor or subcontractor, under the contract, receives, possesses, uses, transfers or acquires sources of radiation, and the contractor or subcontractor is included in one of the following categories:

(1) Prime contractors performing work for the U.S. department of energy at U.S. government-owned or controlled sites, including the transportation of sources of radiation to or from such sites and the performance of contract services during temporary interruptions of such transportation;

(2) prime contractors of the U.S. department of energy performing research in, or development, manufacture, storage, testing or transportation of, atomic weapons or components of atomic weapons;

(3) prime contractors of the U.S. department of energy using or operating nuclear reactors or other nuclear devices in a United States government-owned vehicle or vessel; and

(4) any other prime contractor or subcontractor of the U.S. department of energy or the U.S. nuclear regulatory commission when the secretary determines that, under the terms of the contract or subcontract, there is adequate assurance the work can be accomplished without undue risk to the public health and safety. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-141. **Additional requirements.** At the time of registration, at the time of action upon application for license or amendment to the license, or upon inspection, the department shall specify any requirements or conditions of use, or both, that are necessary to ensure compliance with these regulations under the particular usage to which the licensee or registrant proposes to put the source of radiation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-142. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-143. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; revoked Sept. 20, 1993.)

28-35-144. **Appendix B—Tests for special form licensed material.**

(a) ''Free Drop'' means releasing material, without thrust, from a point 30 feet above a flat, essentially unyielding, horizontal surface, so that the material strikes the surface.

(b) ''Percussion'' means impacting material with the flat, circular end of a one inch diameter steel rod weighing three pounds, by releasing the steel rod a distance of forty inches above the surface of the material. The material shall be placed on a sheet of lead, of hardness number 3.5 to 4.5 on the Vickers scale, and not more than one inch thick, supported by a smooth, essentially unyielding surface.

(c) Heating: heating in air to a temperature of 1,475°F. and remaining at that temperature for a period of 10 minutes.

(d) Immersion: immersion for 24 hours in water at room temperature. The water shall be at pH 6—pH 8, with a maximum conductivity of 10 micromhos per centimeter. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-144a. (a) As used in these regulations, the quality factors for converting absorbed dose to dose equivalent are shown in table I.

TABLE I
QUALITY FACTORS AND ABSORBED DOSE EQUIVALENCIES

TYPE OF RADIATION	Quality Factor (Q)	Absorbed Dose Equal to a Unit Dose Equivalent[a]
X, gamma, or beta radiation and high-speed electrons	1	1
Alpha particles, multiple-charged particles, fission fragments and heavy particles of unknown charge	20	0.05
Neutrons of unknown energy	10	0.1
High-energy protons	10	0.1

[a] Absorbed dose in gray equal to 1 Sv or the absorbed dose in rad equal to 1 rem.

(b) If it is more convenient to measure the neutron fluence rate than to determine the neutron dose equivalent rate in sievert per hour or rem per hour, as provided in K.A.R. 28-35-144a(a), 0.01 Sv (1 rem) of neutron radiation of unknown energies may, for purposes of these regulations, be assumed to result from a total fluence of 25 million neutrons per square centimeter incident upon the body. If sufficient information exists to estimate the approximate energy distribution of the neutrons, the licensee or registrant may use the fluence rate per unit dose equivalent or the appropriate Q value from table II to convert a measured tissue dose in gray or rad to dose equivalent in sievert or rem.

TABLE II
MEAN QUALITY FACTORS, Q, AND FLUENCE PER UNIT DOSE EQUIVALENT FOR MONOENERGETIC NEUTRONS

	Neutron Energy (MeV)	Quality Factor [a] (Q)	Fluence per Unit Dose Equivalent [b] (neutrons cm^{-2} rem^{-1})	Fluence per Unit Dose Equivalent [b] (neutrons cm^{-2} Sv^{-1})
(thermal)	2.5E-8	2	980E1 6	980E1 8
	1E-7	2	980E1 6	980E1 8
	1E-6	2	810E1 6	810E1 8
	1E-5	2	810E1 6	810E1 8
	1E-4	2	840E1 6	840E1 8
	1E-3	2	980E1 6	980E1 8
	1E-2	2.5	1010E1 6	1010E1 8
	1E-1	7.5	170E1 6	170E1 8
	5E-1	11	39E1 6	39E1 8
	1	11	27E1 6	27E1 8
	2.5	9	29E1 6	29E1 8
	5	8	23E1 6	23E1 8
	7	7	24E1 6	24E1 8
	10	6.5	24E1 6	24E1 8
	14	7.5	17E1 6	17E1 8
	20	8	16E1 6	16E1 8
	40	7	14E1 6	14E1 8
	60	5.5	16E1 6	16E1 8
	1E1 2	4	20E1 6	20E1 8
	2E1 2	3.5	19E1 6	19E1 8
	3E1 2	3.5	16E1 6	16E1 8
	4E1 2	3.5	14E1 6	14E1 8

[a] Value of quality factor (Q) at the point where the dose equivalent is maximum in a 30-centimeter diameter cylinder tissue-equivalent phantom.

[b] Monoenergetic neutrons incident normally on a 30-centimeter diameter cylinder tissue-equivalent phantom.

(Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-145. **License and registration fees.** (a) Each person who applies for a license, amendment to a license, or a renewal of a license pursuant to K.S.A. 48-1607, and any amendments thereto, shall pay a fee based on the cost of providing and servicing the license.

(b) Each person who registers an item shall pay a fee based on the cost of providing and servicing the registration. All items shall be registered annually within 30 days of receipt of a notice of registration from the department or within 30 days of obtaining a registrable device. (Authorized by and implementing K.S.A. 1985 Supp. 48-1606, effective May 1, 1987.)

28-35-146. **License and registration fee requirements.** (a) In general, a fee shall be required for licensed radioactive, by-product, source, or special nuclear materials. A fee shall not be required for:

(1) Any license authorizing the use of source material used only as shielding for devices and containers; or

(2) any general license issued under K.A.R. 28-35-178a through 28-35-178i and any amendment to those regulations.

(b) License fees. Each application for which a license fee is required shall be accompanied by the full amount of the fee. Applications for which a fee is not received may be returned to the applicant. Fees shall not be returned regardless of:

(1) the department's approval or disapproval of the application; or

(2) the withdrawal of the application.

(c) Amendment fees. The appropriate license amendment fee shall accompany each application for amendment of the provisions of a license. If the applicant is applying for an amendment of a license under K.A.R. 28-35-147(a)(15) or 28-35-147(a)(23) and any amendments thereto, the applicant shall tentatively determine whether the amendment is an administrative amendment or an amendment with safety and environmental considerations. The applicant shall state the basis for this determination as a part of the application and shall remit the fee corresponding to this determination with the application for amendment. The department shall review each application and fee determination. After the review the department may: (1) Accept the amount determined;

(2) return to the applicant any overcharges; or

(3) bill the applicant for any additional amendment fee.

(d) License for multi-purpose use fees. If the applicant is applying for an amendment or a new license authorizing more than one of the uses described under K.A.R. 28-35-147, the applicant shall submit the highest fee established for the uses requested.

(e) Registration. Each registration submitted under K.A.R. 28-35-153, 28-35-154 or 28-35-157 shall be accompanied by the full amount of the fee.

(f) Maximum registration payments. Each registrant possessing medical or dental x-ray machines in a hospital, clinic or private office shall pay no more than $150.00 per year regardless of the number of machines.

(g) Method of payment. Fee payment shall be by check, draft, or money order made payable to the department of health and environment.

(h) Applicability. This regulation shall apply to all applications for licenses, amendments to licenses, permits, registrations or renewals filed with the department on or after the effective date of this regulation. (Authorized by and implementing K.S.A. 1985 Supp. 48-1606, effective May 1, 1987; amended May 1, 1988.)

28-35-147. **Schedule of fees.** (a) The following license fees shall be paid as provided in K.A.R. 28-35-146 and any amendments thereto.

(1) Licenses for possession and use of special nuclear material in sealed sources that are contained in devices used in industrial measuring systems.

New License: $500.00

Amendment to License: $300.00

(2) Any other licenses for possession and use of special nuclear material, except those listed in paragraph (1) and paragraphs (16) through (24) of this subsection.

New License: $1,200.00

Amendment to License: $300.00

(3) All source material licenses, except those listed in paragraphs (16) through (24) of this subsection.

New License: $600.00

Amendment to License: $300.00

(4) Licenses for possession and use of radioactive or by-product material for the purpose of processing or manufacturing items containing radioactive or by-product material for commercial distribution, where more than one radionuclide is used or the handling of unsealed sources is required.

New License: $2,000.00

Amendment to License: $300.00

(5) Licenses for possession and use of radioactive or by-product material for the purpose of processing or manufacturing items containing radioactive or by-product material for commercial distribution, where only one radionuclide is used and only sealed sources are handled.

New License: $1,200.00

Amendment to License: $300.00

(6) Licenses for possession and use of radioactive or by-product material for the purpose of processing, manufacturing or distributing radiopharmaceuticals containing radioactive or by-product materials.

New License: $800.00

Amendment to License: $300.00

(7) Licenses for possession and use of radioactive or by-product materials in permanent, shielded facilities for industrial radiography.

New License: $2,500.00

Amendment to License: $500.00

(8) Licenses for possession and use of industrial radiography devices in permanent, shielded facilities or on multiple temporary job sites.

New License: $2,500.00

Amendment to License: $500.00

(9) Licenses for possession and use of radioactive or by-product material for irradiation of materials in which the source is not removed from its shield for irradiation purposes.

New License: $500.00

Amendment to License: $400.00

(10) Licenses for possession and use of radioactive or by-product material for irradiation of material in which the source is removed from its shield for irradiation purposes.

New License: $3,000.00

Amendment to License: $500.00

(11) Licenses authorizing distribution of radioactive or by-product materials to persons generally licensed as provided in K.A.R. 28-35-175 to 28-35-200, inclusive, and amendments thereto.

New License: $1,500.00

Amendment to License: $700.00

(12) Licenses authorizing distribution of radioactive or by-product material to persons exempt from the licensing requirement of K.A.R. 28-35-175 to 28-35-200, inclusive, and amendments thereto.

New License: $1,600.00

Amendment to License: $800.00

(13) Licenses for possession and use of radioactive or by-product material for the purpose of research and development, except those licenses covered by paragraph (4), (5), (6), (19)(B) or (C) of this subsection.

New License: $1,400.00

Amendment to License: $600.00

(14) Licenses for possession and use of radioactive or by-product material, except those listed in paragraphs (4) through (24) of this subsection.

New License: $600.00

Amendment to License: $300.00

(15) Licenses specifically authorizing the receipt of radioactive, by-product, source, or special nuclear material wastes from other persons for the purpose of packaging of material.

New License: $2,000.00

Amendment to license concerning Safety and Environmental questions: $800.00

Amendment to license concerning Administrative questions (No safety or environmental questions) $450.00

(16) Licenses specifically authorizing the receipt of packaged radioactive, by-product, source, or special nuclear material wastes from other persons.

New License: $1,000.00

Amendment to License: $500.00

(17) Licenses specifically authorizing possession and use of radioactive, by-product, source, or special nuclear material for the purpose of well logging, well surveys, or tracer studies.

New License: $1,000.00

Amendment to License: $500.00

(18) Licenses specifically authorizing commercial collection and laundry of items contaminated with radioactive, by-product, source or special nuclear material.

New License: $800.00

Amendment to License: $300.00

(19) Licenses specifically authorizing the medical use of radioactive, source, by-product or special nuclear materials.

(A) Licenses authorizing the use of radioactive, or by-product material in sealed sources contained in teletherapy devices.

New License: $1,500.00

Amendment to License: $500.00

(B) Licenses authorizing the use of radioactive, by-product, source or special nuclear material in a medical institution or by two or more physicians, for medical purposes, except licenses covered in paragraph 19(A) above.

New License: $700.00

Amendment to License: $300.00

(C) Licenses authorizing the use of radioactive, by-product, source or special nuclear material by private physicians for medical purposes, except licenses covered in paragraph (19)(A) above.

New License: $500.00

Amendment to License: $300.00

(20) Licenses authorizing possession and use of radioactive, by-product, source or special nuclear material for civil defense purposes.

New License: $500.00

Amendment to License: $300.00

(21) Review of a device, product or sealed source containing radioactive, by-product, source or special nuclear material for distribution to general licensees or persons exempt from licensing.

Each device, product or sealed source review: $1,500.00

(22) Licenses authorizing the manufacturing and distribution of incapsulated radioactive, by-product, source or special nuclear material in a device that uses decay heat as a source of power.

New License: $3,500.00

Amendment to License: $470.00

(23) Licenses authorizing the possession and use of waste radioactive by-product, source or special nuclear material for a commercial low level waste disposal facility.

New License: $300,000.00

Amendment to license concerning Safety and Environmental questions: $100,000.00

Amendment to License concerning Administrative questions (No safety or environment questions): $1,500.00

(24) Licenses authorizing the possession and use of radioactive materials (Ra-226) in luminous paint or in products containing such paint.

New License: $1,000.00

Amendment to License: $300.00

(b) At the request of the licensee, a license shall be renewed by an amendment which changes only the expiration date of the license. The cost shall be that of an amendment. After five amendments have been made which provide for changes other than the expiration date or after 10 years have elapsed, whichever comes first, the license shall be rewritten and reevaluated in its entirety and the fee shall be the same as that for a new license.

(c) The following registration fees shall be paid pursuant to K.A.R. 28-35-146, and any amendments thereto:

(1) Medical x-ray machines, including those x-ray machines used in hospitals or clinics by or under the supervision of medical doctors, osteopaths, or chiropractors.

First machine: $56.00

Each additional machine: $13.00

(2) Dental x-ray machines, including those machines used in hospitals, dental clinics or private offices by or under the supervision of dentists, podiatrists, and veterinarians.

First machine: $36.00

Each additional machine: $11.00

(3) Industrial radiographic machines.

First machine: $36.00

Each additional machine: $11.00

(4) Analytical x-ray machines.

First machine: $36.00

Each additional machine: $11.00

(5) Particle accelerators.

Each machine: $78.00

(Authorized by and implementing K.S.A. 1990 Supp. 48-1606; effective May 1, 1987; amended May 1, 1988; amended March 16, 1992.)

28-35-148 to 28-35-151. **Reserved.**

PART 2.—REGISTRATION OF RADIATION PRODUCING DEVICES

28-35-152. **Persons registered.** Any person possessing a registrable item shall register with the department in accordance with the rules and regulations in this part. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-153. **Initial registration.** Any person who is not registered and who acquires possession of a registrable item shall register with the department, within 30 days of the date of acquiring the item. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-154. **Renewal of registration.** Each registrant shall reregister with the department. This registration shall be completed within 60 days of the date on which a registration form is sent to the registrant. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-155. **Registration form.** Registration shall be made upon forms devised and furnished by the department. Each registrant shall provide all the information called for by the form and any additional information requested by the department. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-156. **Separate installations.** Except as otherwise provided in K.A.R. 28-35-157, and any amendment to that rule and regulation, a separate registration form shall be completed for each installation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-157. **Special registration.** If the reporting of each installation, or other information called for, is impractical, the secretary, upon the written request of a person and upon a finding that the public health and safety would not be adversely affected, may approve registration in such special form as the secretary may prescribe. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-158. **Report of change.** If a change is made on any x-ray equipment or other device producing radiation, or to any installation, so that information on file with the department is no longer accurate, the registrant shall notify the department, in writing, of the change, within 30 days of the date the change was made. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-159. **Registration shall not imply approval.** A person shall not refer, in any form of advertisement, to the fact a registrable item is registered with the department, or state or imply that any installation registered with the department is approved by the department. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-160. **Vendor notification.** Any distributor, retailer, or other person who sells, leases, transfers, or lends registrable items shall notify the department at 90 day intervals of:

(a) The names and addresses of persons who have received these items;

(b) the name of the manufacturer and model number of the source or device transferred; and

(c) the date on which the registrable item, or items, were transferred. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective

Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-161. **Discontinuance of use.** If a registrant ceases to use a registrable item or items, for any reason, the registrant or the duly authorized representative of the registrant's estate shall give written notice to the department of the cessation of use. The notice shall be provided within 30 days of the date that the registrant ceases to use the registrable item or items, and shall state the date on which use of the item or items was discontinued and the manner in which the registrable item or items were disposed. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-162. **Exclusion from registration.** The following equipment shall not be required to be registered:

(a) Electrical or electronic equipment, which:

(1) is not intended primarily to produce radiation;

(2) does not produce a radiation level greater than 0.5 mR/hr, at any point five centimeters from the surface; and

(3) is used or handled in such a manner that any individual cannot receive a dose to the whole body of 0.5 or more rems in a year, and

(b) radiation-producing equipment which is in transit or which is in storage incident to transit. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-163. **Excluded possessors.** (a) Except as provided in subsection (b), a common carrier or contract carrier operating within this state who is in possession of a registrable item or items shall be exempt from the provisions of these regulations, if the carrier possesses the registrable item or items for another person, solely for the purpose of transporting or storing the item or items.

(b) Each common carrier or contract carrier shall be subject to the provisions of K.A.R. 28-35-228a and 28-35-229a, and any amendments of those rules and regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-164. **Temporary use or storage of registrable items.** Any person desiring to bring a registrable item into this state for temporary use or storage shall give written notice to the department before bringing the item into this state. The notice shall be given to the department at least five days before the item is to be brought into this state and shall include the type and energy of the radiation source, the nature and scope of the use or storage, the proposed duration of use or storage, and the exact location where the radiation source is to be used or stored. If, in a specific case, the five day period would impose an undue hardship on the person, the person, upon application by letter or telegram to the department, may obtain permission to proceed at an earlier date.

In addition, the person shall:

(a) Comply with all applicable regulations for the department; and

(b) supply the department with such other information as it may request.

If a registrable item is kept in the state for a total of 30 days, in a period of 12 consecutive months, it shall be considered to be permanently located in the state and shall be subject to the registration provision of these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-165. **Disposal of registered items.** Whenever any person disposes of a registrable item, or items, by any method, the person, or in the event of the person's death, the representative of the person's estate, shall give written notice to the department of the disposal within 30 days. The notice shall include the date of disposal, the method of disposal, and, if transferred to another person, the name and address of the recipient. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-166. **Shoe fitting, fluoroscopic machines; prohibition of.** No person shall install, operate or maintain any device or machine within the state of Kansas which uses fluoroscopic, X-ray or radiation principles for the purpose of fitting shoes. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-167 to 28-35-174. **Reserved.**

PART 3.—LICENSING OF SOURCES OF RADIATION

28-35-175. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-175a. **Persons licensed.** (a) A person shall not receive, use, possess, transfer, or dispose of radioactive material except as authorized in a specific or general license issued pursuant to these regulations, or as otherwise provided in these regulations. Each manufacturer, producer or processor of any equipment, device, commodity or other product containing source or by-product material for which subsequent possession, use, transfer and disposal by any other person is exempted from these regulations shall obtain authority to transfer possession or control to such other person from the U.S. nuclear regulatory commission, Washington, D.C. 20555.

(b) In addition to the requirements of this part, all licensees are subject to the requirements of part 1, part 4 and part 10 of these regulations. Licensees engaged in industrial radiographic operations shall be subject to the requirements of part 7 and licensees using sealed sources in the healing arts shall be subject to the requirements of part 6 of these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-176. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-176a. **Types of licenses.** Licenses for radioactive materials shall be of two types: general and specific.

(a) General licenses provided in this part shall be effective without the filing of applications with the department or the issuance of licensing documents to particular persons. The general licensee shall be subject to all other applicable portions of these regulations and any limitations of the general license.

(b) Specific licenses shall require the submission of an application to the department and the issuance of a licensing document by the department. The licensee shall be subject to all applicable portions of these regulations as well as any limitations specified in the licensing document. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-177. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-177a. **General licenses—source material.** (a)(1) A general license is hereby issued authorizing the acquisition, possession, use, and transfer of not more than 15 pounds of source material at any one time by persons in the following categories:

(A) Pharmacists using the source material solely for the compounding of medicinals;

(B) physicians using the source material for medicinal purposes;

(C) persons receiving possession of source material from pharmacists or physicians in the form of medicinals or drugs; and

(D) commercial and industrial firms, research, educational, medical institutions, and state and local governmental agencies for research, development, educational, or commercial purposes. A person shall not, pursuant to this general license, acquire or possess more than a total of 150 pounds of source material in any one calendar year.

(2) Persons who acquire, possess, use, or transfer source material pursuant to the general license issued in subsection (a) shall be exempt from the provisions of parts 4 and 10 of these regulations to the extent the acquisition, possession, use, or transfer is within the terms of the general license. However, this exemption shall not apply to any person who is also in possession of source material under a specific license issued pursuant to these regulations.

(b) A general license is hereby issued authorizing the receipt of title to source material without regard to quantity. This general license shall not authorize any person to receive, possess, use, or transfer source material.

(c) (1) Subject to the requirements of paragraphs (2), (3), and (4) of this subsection, a general license is issued to acquire, possess, use, or transfer depleted uranium contained in industrial products or devices for the purpose of providing a concentrated mass in a small volume of the product or device.

(2)(A) Any person who acquires, possesses or uses depleted uranium pursuant to the general license issued in this subsection shall file form RH-85 with the department. The form shall be filed

within 30 days of the date the depleted uranium is received or acquired. Each person filing a form RH-85 shall provide all the information requested by the form.

(B) If any change in circumstances renders any information provided on form RH-85 inaccurate, the department shall be provided written notice of the change within 30 days of the date of the change.

(3) Any person who acquires, possesses or uses depleted uranium pursuant to the general license issued in this subsection shall not:

(A) Introduce depleted uranium, in any form, into a chemical, physical or metallurgical treatment or process, except a treatment or process for the repair or restoration of any plating or other covering of the depleted uranium;

(B) abandon depleted uranium; or

(C) export depleted uranium, except in accordance with a license issued by the U.S. nuclear regulatory commission.

(4)(A) Any person possessing depleted uranium pursuant to the general license issued in this subsection shall transfer (or dispose of) the depleted uranium only by transfer in accordance with K.A.R. 28-35-190a.

(B) When depleted uranium is transferred to any person in this state, the transferor shall furnish the transferee a copy of this regulation and form RH-85.

(C) When depleted uranium is transferred to any person outside this state, the transferor shall furnish the transferee with a copy of this regulation, form RH-85, and a written notice that possession or use of the depleted uranium is regulated by the U.S. nuclear regulatory commission of the state in which the person is located, under requirements substantially the same as those in this regulation.

(D) Any person who transfers depleted uranium pursuant to this subsection shall give written notice to the department of the name and address of the person to whom the depleted uranium was transferred. The notice shall be filed within 30 days of the date of transfer.

(d) Any person who acquires, possesses, uses or transfers depleted uranium pursuant to subsection (c) of this regulation shall be exempt from the requirements of parts 4 and 10 of these regulations with respect to the depleted uranium acquired, possessed, used or transferred by that person. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-178a. **General license—certain ionization devices.** (a) A general license is hereby issued to acquire, possess, use and transfer radioactive material incorporated in any device or equipment as described in this subsection, if the device or equipment is manufactured, tested and labeled by a manufacturer in accordance with the specifications of a specific license issued to the manufacturer by the secretary, the U.S. nuclear regulatory commission or an agreement state. This general license shall apply to:

(1) Static elimination devices which are designed for ionization of air and which contain, as a sealed source or sources, radioactive material containing a total of not more than 500 microcuries of polonium-210 per device; and

(2) Ion generating tubes which are designed for ionization of air and which contain, as a sealed source or sources, radioactive material consisting of a total of not more than 500 microcuries of polonium-210 per device or a total of not more than 50 millicuries of hydrogen-3 (tritium) per device.

(b) The general license issued in subsection (a) of this regulation shall be subject to the provisions of K.A.R. 28-35-137 to 28-35-139, inclusive, 28-35-192a(b)(1)(C), 28-35-184a, 28-35-190a, 28-35-191a, 28-35-196a, 28-35-219a(f) and all of parts 4 and 10 of these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178b. **General license—certain measuring, gauging and control devices.** (a)(1) Subject to the provisions of subsection (b) and (c) of this regulation, a general license is hereby issued to acquire, possess, use and transfer radioactive material which is contained in any device designed, manufactured and used for one or more of the following purposes:

(A) detecting, measuring, gauging or controlling thickness, density, level interface location, radiation leakage, or qualitative or quantitative chemical composition; or

(B) producing light or an ionized atmosphere.

(2) The general license issued in paragraph (1) of this subsection shall apply only to radioactive material contained in any device which has been manufactured and labeled by a manufacturer in accordance with the specifications of a specific license issued to that manufacturer by the secretary, the U.S. nuclear regulatory commission or an agreement state.

(b) Each person who acquires, possesses or uses radioactive material in a device pursuant to the general license issued in subsection (a) of this regulation shall comply with the following requirements:

(1) Each person subject to this subsection shall assure that all labels which are affixed to the device at the time of receipt and which bear a statement that removal of the label is prohibited are maintained and shall comply with all instructions and precautions provided by these labels.

(2) Each person subject to this subsection shall assure that the device is tested for leakage of radioactive material and proper operation of the on-off mechanism and indicator, if any, at no longer than six-month intervals or at such other intervals as are specified in any manufacturer's label affixed to the device, except as follows.

(A) Such person shall not be required to test devices containing only Krypton for leakage of radioactive material.

(B) Such persons shall not be required to test, for any purpose, any device containing only tritium or not more than 100 microcuries of other beta or gamma-emitting material or 10 microcuries of alpha-emitting material or any device held in storage in the original shipping container prior to initial installation.

(3) Each person subject to this subsection shall assure that the tests required by paragraph (b)(2) of this subsection and other operations involving testing, installation, servicing and removal from installation of the radioactive material, its shielding or containment, are performed:

(A) In accordance with instructions provided on labels affixed to the device; or

(B) by a person holding a specific license to perform such activities.

(4)(A) Each person subject to this subsection shall maintain records showing compliance with the requirements of paragraphs (b)(2) and (b)(3). The records shall show the results of each test. The records also shall show the dates of the testing, installation, servicing, or removal from installation of the radioactive material, its shielding or containment and the name of each person performing one or more of these activities.

(B) Such persons shall maintain records of tests for leakage of radioactive material required by paragraph (b)(2) for one year after the next, required leak test is performed or until the sealed source is transferred or disposed. Such persons shall maintain records of tests of the on-off mechanism and indicator, as required by paragraph (b)(2) for one year after the next, required test of the on-off mechanism and indicator is performed or until the sealed source is transferred or disposed. Such persons shall maintain records which are required by paragraph (b)(3) for a period of two years from the date of the recorded event or until the device is transferred or disposed.

(5) Upon a failure of or damage to, or any indication of a possible failure of or damage to, the shielding of the radioactive material or the on-off mechanism or indicator, or upon the detection of 0.005 microcurie or more removable radioactive material, each person subject to this subsection shall take the following actions:

(A) immediately suspend operation of the device until the device:

(i) has been repaired by the manufacturer or other person holding a specific license to repair such devices; or

(ii) is transferred to a person authorized by a specific license to receive the radioactive material contained in the device; and

(B) within 30 days, furnish to the secretary a report containing a brief description of the event and the remedial action taken.

(6) Each person subject to this subsection shall not abandon the device.

(7) Except as provided in paragraph (c)(8) of this subsection, each person subject to this subsection shall transfer the device only to a person holding a specific license to receive the device, and within 30 days after the transfer, shall furnish to the secretary a written report containing an identification of the device by manufacturer's name and model number, and the name and address of the person to whom the device was transferred. However, a report shall not be required if the device is transferred to a specific licensee only for the purpose of obtaining a replacement device.

(8) Each person subject to this subsection shall transfer the device to another general licensee only:

(A) When the device remains in use at a particular location. In this case, the transferor shall

give the transferee a copy of this regulation and any safety documents identified in any label affixed to the device, and within 30 days of the transfer, provide a written report to the secretary containing identification of the device by manufacturer's name and model number, the name and address of the transferee, and the name and position of an individual who may be contacted by the secretary concerning the device; or

(B) When the device is held in storage in the original shipping container at its intended location of use prior to initial use by a general licensee.

(9) Each person subject to this subsection shall comply with the provisions of K.A.R. 28-35-228a and 28-35-229a relating to reports of radiation incidents, theft or loss of licensed material, but shall be exempt from the other requirements of parts 4 and 10 of these regulations.

(c) Nothing in this rule and regulation shall be deemed to authorize the manufacture of any device containing radioactive material.

(d) The general license issued in subsection (a) of this regulation shall be subject to the provisions of K.A.R. 28-35-184a and K.A.R. 28-35-184b. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Nov. 1, 1996.)

28-35-178c. **General license to install devices generally licensed in K.A.R. 28-35-178b.** Any person who holds a specific license issued by the U.S. nuclear regulatory commission or an agreement state authorizing the holder to manufacture, install, or service a device described in K.A.R. 28-35-178b is hereby granted a general license to install and service such a device in this state, if:

(a) The device has been manufactured, labeled, installed and serviced in accordance with the provisions of the specific licenses issued in regard to manufacturing, labeling, installing and servicing the device; and

(b) Such person assures that all labels required to be affixed to the device are in place. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178d. **Luminous safety devices for use in aircraft.** (a) A general license is hereby issued to acquire, possess, and use tritium or promethium-147 contained in luminous safety devices for use in aircraft if:

(1) the device contains not more than 10 curies of tritium or 300 millicuries of promethium-147; and

(2) the device has been manufactured, assembled or imported in accordance with a specific license, issued under the provisions of section 32.53 of the regulations of the United States nuclear regulatory commission or manufactured or assembled in accordance with a specific license issued by an agreement state, which authorizes manufacture or assembly of the device for distribution to persons generally licensed by the agreement state.

(b) Persons who acquire, possess or use luminous safety devices pursuant to the general license issued in subsection (a) of this regulation shall be exempt from the requirements of parts 4 and 10 of these regulations, except that they shall comply with the provisions of K.A.R. 28-35-228a and 28-35-229a.

(c) The general license issued in this regulation shall not authorize the manufacture, assembly or repair, or the importation or exportation, of luminous safety devices containing tritium or promethium-147.

(d) The general license issued in this regulation shall not authorize the acquisition, possession or use of promethium-147 contained in instrument dials. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178e. **Americium-241 in the form of calibration or reference sources.** (a) A general license to acquire, possess, use and transfer, in accordance with the provisions of subsection (b) and (c) of this section, americium-241 in the form of calibration or reference sources is hereby issued to any person who holds a specific license issued by the U.S. nuclear regulatory commission which authorizes the agency to acquire, possess, use and transfer by-product material, source material, or special nuclear material.

(b) The general license issued in subsection (a) of this section applies only to calibration or reference sources which have been manufactured or initially transferred in accordance with the specifications contained in a specific license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state.

(c) The general license issued in subsection (a) of this section is subject to the provisions of K.A.R. 28-35-184a, and to all of the provisions of

parts 4 and 10 of these regulations. In addition, persons who acquire, possess, use, and transfer one or more calibration or reference sources pursuant to this general license:

(1) Shall not possess, at any one time, at any one location of storage or use, more than 5 microcuries of americium-241 in such sources;

(2) shall not receive, possess, use or transfer such a source unless the source, or the storage container, bears a label which includes the following statement or a substantially similar statement which contains the information called for in the following statement:

"The receipt, possession, use and transfer of this source, Model _____ , Serial No. _____, are subject to a general license and the regulations of the United States Nuclear Regulatory Commission or of a State with which the commission has entered into an agreement for the exercise of regulatory authority. Do not remove this label.

CAUTION—RADIOACTIVE MATERIAL—THIS SOURCE CONTAINS AMERICIUM-241. DO NOT TOUCH RADIOACTIVE PORTION OF THIS SOURCE.

_____

(Name of manufacturer or initial transferor)";

(3) shall not transfer, abandon, or dispose of such source except by transfer to a person authorized by a license issued by the secretary, the U.S. nuclear regulatory commission or by an agreement state to receive the source;

(4) shall store such source, except when the source is being used, in a closed container designed and constructed to contain americium-241 which might otherwise escape during storage; and

(5) shall not use the source for any purpose other than the calibration of radiation detectors or the standardization of other sources.

(d) The general license issued in this regulation shall not authorize the manufacture, or the importation or exportation, of calibration or reference sources containing americium-241. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178f. **General license to own radioactive material.** A general license is hereby issued to own radioactive material without regard to quantity. However, a general licensee under this regulation is not authorized to manufacture, produce, transfer, receive, possess, use, import or export radioactive material, except as authorized in a specific license. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178g. **General license for strontium-90 in ice detection devices.** (a) A general license is hereby issued to own, acquire, possess, use and transfer strontium-90 contained in ice detection devices if each device contains not more than 50 microcuries of strontium-90 and if each device is manufactured or initially transferred in accordance with the specifications contained in a license issued to the manufacturer by the secretary, the U.S. nuclear regulatory commission or an agreement state.

(b) Persons who own, acquire, possess, use, or transfer strontium-90 contained in ice detection devices pursuant to the general license issued in subsection (a) of this section:

(1) Shall, if visually observable damage to the device occurs, including a bend or crack or discoloration from overheating, discontinue use of the device until it has been inspected, tested for leakage and repaired by a person holding a specific license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state to manufacture or service the device, or shall dispose of the device pursuant to the provisions of K.A.R. 28-35-223a;

(2) Shall assure that all labels affixed to the device at the time of receipt, and which bear a statement that prohibits removal of the labels, are maintained thereon;

(3) Shall be exempt from the requirements of parts 4 and 10 of these regulations, except that such persons shall comply with the provisions of K.A.R. 28-35-223a, 28-35-228a and 28-35-229a.

(c) This general license shall not authorize the manufacture, assembly, disassembly or repair, or the importation or exportation, of strontium-90 in ice detection devices. (Authorized by and implementing K.A.R. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178h. **General license for use of by-product material for certain in vitro clinical or laboratory testing.** (a) A general license is hereby issued to any physician, veterinarian in the practice of veterinary medicine, clinical laboratory or hospital to acquire, possess, use and transfer in accordance with the provisions of subsections (b), (c), (d), (e), and (f) of this section, the following radioactive materials in prepackaged units for use in any of the following stated tests:

(1) Iodine-125, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external ad-

ministration of radioactive material, or the radiation therefrom, to human beings or animals.

(2) Iodine-131, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(3) Carbon-14, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(4) Hydrogen-3 (tritium), in units not exceeding 50 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(5) Iron-59, in units not exceeding 20 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(6) Selenium-75, in units not exceeding 10 microcuries each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(7) Mock Iodine-125 reference or calibration sources, in units not exceeding 0.05 microcuries of Iodine-129 and 0.005 microcurie of americium-241 each, for use in in vitro clinical or laboratory tests not involving internal or external administration of radioactive material, or the radiation therefrom, to human beings or animals.

(8) Cobalt-57, in units not exceeding 10 microcuries each, for use in in vitro clinical or labratory tests not involving internal or external administration of radioactive material or the radiation therefrom, to human beings or animals.

(b)(1) A person shall not acquire, possess, use or transfer radioactive material pursuant to the general license issued in subsection (a) of this section until the person has filed form RH-31, ''Registration Certificate—In Vitro Testing with Radioactive Material Under General License,'' with the secretary and has received from the secretary a validated copy of the form, with a registration number assigned, or until the person has been authorized pursuant to K.A.R. 28-35-181d(d) to use radioactive material under the general license issued in subsection (a) of this regulation.

(2) Each person who files a form RH-31 shall provide all the information requested by that form.

(c) Each person who acquires, possesses, or uses radioactive material pursuant to the general license issued in subsection (a) of this section:

(1) Shall not possess, at any one time, at any one location of storage or use, a total amount of iodine-125, iodine-131, selenium-75, cobalt-57 or iron-59 in excess of 200 microcuries;

(2) shall store the radioactive material, until used, in the original shipping container or in a container providing equivalent radiation protection;

(3) shall use the radioactive material only for the uses authorized in subsection (a) of this section;

(4) shall not transfer the radioactive material except by transfer to a person authorized to receive it under a license issued by the secretary, the U.S. nuclear regulatory commission or an agreement state, and shall not transfer the radioactive material in any manner other than in the unopened, labeled shipping container as received from a supplier; and

(5) shall dispose of mock iodine-125 reference or calibration sources in accordance with the requirements of K.A.R. 28-35-223a.

(d) Each general licensee shall not receive, acquire, possess, or use radioactive material pursuant to subsection (a) of this section:

(1) Except as prepackaged units which are labeled in accordance with the provisions of a specific license issued by the secretary, the U.S. nuclear regulatory commission, or an agreement state; and

(2) Unless the following statement, or a substantially similar statement which contains the information called for in the following statement, appears on a label affixed to each prepackaged unit or appears in a leaflet or brochure which accompanies the package:

''This radioactive material may be received, acquired, possessed, and used only by physicians, veterinarians in the practice of veterinary medicine, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the U.S. nuclear regulatory commission or of a state with which the commission has entered into an agreement for the exercise of regulatory authority.

(Name of Manufacturer)''

(e) Each person possessing or using radioactive

materials under the general license issued in subsection (a) of this section shall file a written report with the secretary of any change in the information furnished on form RH-31. The report shall be filed within 30 days after the effective date of any change.

(f) Any person using radioactive material pursuant to the general license issued in paragraph (1) of subsection (a) shall be exempt from the requirements of parts 4 and 10 of these regulations with respect to radioactive materials covered by that general license, except that any person using Mock Iodine-125 shall comply with the provisions of K.A.R. 28-35-223a, 28-35-228a and 28-35-229a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-178i. **General licenses for certain units of radium-226.** (a) Subject to the limitations prescribed in subsection (b), (c) and (d) of this regulation, a general license is hereby issued to commercial and industrial firms, and to research, educational, medical and governmental institutions, to acquire, possess, use, and transfer radium-226 in units not exceeding 0.1 microcurie each.

(b) A person shall not acquire, possess, use or transfer radium-226 pursuant to the general license issued in subsection (a) of this regulation until the person has filed form RH-37 with the secretary and has received from the secretary a validated copy of the form, with a certification number assigned. Each person filing a form RH-37 shall provide all the information required by that form.

(c) Each general licensee under this regulation:

(1) Shall not possess, at any one time and at any one location of storage or use, a total amount of radium-226 in excess of five microcuries;

(2) shall store the radium-226, until used, in the original shipping container or in a container providing equivalent radiation protection;

(3) shall transfer the radioactive material only to a person who is authorized to receive it pursuant to a license issued by the secretary, the United States nuclear regulatory commission or an agreement state; and

(4) shall not transfer the radioactive material in any manner other than in the unopened, labeled shipping container as received from the shipper.

(d) Each general licensee under this regulation shall file a written report with the secretary of any changes in the information filed in form RH-37. The report shall be furnished within 30 days after the effective date of the change.

(e) Each general licensee under this regulation shall be exempt from the requirements of parts 4 and 10 of these regulations with respect to the radioactive material covered by the general license.

(f) The general license issued in this regulation shall not authorize the manufacture, commercial distribution or human use of radium-226. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-179. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-179a. **Application for specific license; renewal or amendment.** (a) Any person may file a written application with the secretary for a specific license to acquire, possess, use or transfer radioactive material, and shall file a written application with the secretary to renew or amend any specific license. Each application for a specific license, or a renewal or an amendment of an existing license, shall be made on the appropriate form prescribed and furnished by the secretary. Each person filing an application shall provide all the information requested on the application form, and any additional information requested by the secretary.

(b) Each application filed with the secretary shall be signed by the applicant or licensee, or by a person authorized to act for or on behalf of the applicant or licensee.

(c) Any application may incorporate, by reference, information provided in applications, reports or other documents previously filed with the secretary. Any reference to information previously filed with the secretary shall be clear and specific.

(d) An application for a specific license may include a request for a license authorizing activity at one or more installations or locations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-180. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-180a. **General requirements for the issuance of specific licenses.** An application

for a specific license shall only be approved if the secretary determines that the application complies with the provisions of K.A.R. 28-35-133 through K.A.R. 28-35-363.

(a) Each applicant shall be qualified by reason of training and experience to use the material in question for the purpose requested, in accordance with these regulations, and in a manner that will protect the public health and minimize danger to life and property.

(b) The proposed equipment, facilities, and procedures used by each applicant shall be adequate to protect the public health and minimize danger to life and property.

(c) A specific license shall be approved if the secretary determines it will not be inimical to the health and safety of the public.

(d) Each applicant shall meet the requirements prescribed in these regulations for the particular license sought.

(e) Each application for a license for commercial waste disposal, source material milling or other activity which the secretary determines will significantly affect the environment shall meet the following conditions.

(1) Each applicant shall provide information which permits the secretary to weigh the environmental, economic, technical, and other benefits against the environmental costs and alternatives.

(2) Each determination made by the secretary to approve a specific license shall be based upon the following:

(A) the information provided in K.A.R. 28-35-180a(e)(1) and other information as necessary; and

(B) the applicable portions of 10 CFR, part 51, Subpart A, § 51.45, as in effect April 30, 1992.

(3) Each applicant shall be authorized to begin construction only after the secretary approves issuance of the license. Commencement of construction prior to the secretary's determination shall be grounds for denial of the license. "Commencement of construction," as used here, means any clearing of land, excavation, or other substantial action that would adversely affect the environment of a site.

(4) On and after 1996, each applicant for a specific license authorizing the possession and use of unsealed radioactive material with a half-life greater than 120 days and in quantities exceeding 10^5 times the applicable quantities set forth in K.A.R. 28-35-201, Schedule F shall submit a decommissioning funding plan as described in paragraph (e) (8) of this regulation. The applicant shall also submit the decommissioning funding plan when a combination of isotopes is involved if R divided by 10^5 is greater than 1 (unity rule), where R is defined here as the sum of the ratios of the quantity of each isotope to the applicable value in K.A.R. 28-35-201, Schedule F.

(5) On or after 1996, each applicant for a specific license authorizing possession and use of radioactive material with a half-life greater than 120 days and in quantities specified in Table I of this regulation shall either:

(A) submit a decommissioning funding plan as described in paragraph (e)(8) of this regulation; or

(B) submit a certification that financial assurance for decommissioning has been provided in the amount prescribed by Table I, using one of the methods described in paragraph (e)(9) of this regulation.

(i) This certification may state that the appropriate assurance will be obtained after the application has been approved and the license issued, but before the receipt of licensed material. If the applicant defers execution of the financial instrument required under paragraph (e)(9) until after the license has been issued, a signed original of the financial instrument shall be submitted to the department before the applicant receives the licensed material.

(ii) If the applicant does not defer execution of the financial instrument required under paragraph (e)(9), the applicant shall submit to the department, as part of the certification, a signed original of the financial instrument.

(6) Each holder of a specific license issued before October 1, 1996 which is of a type described in K.A.R. 28-35-180a (e)(4) or (5) shall provide financial assurance for decommissioning in accordance with the criteria established below.

(A) Each holder of a specific license issued before October 1, 1996 which is of a type described in K.A.R. 28-35-180a(e)(4) shall submit a decommissioning funding plan as described in K.A.R. 28-35-180a paragraph (e)(8) or a certification of financial assurance for decommissioning in an amount at least equal to $750,000.00. The plan or certification shall be submitted to the department in accordance with the criteria set forth in this regulation, not later than 90 days after October 1, 1996. If the licensee submits a certification of financial assurance rather than a decommissioning funding plan, the licensee shall include a decom-

missioning funding plan in any application for license renewal.

(B) Each holder of a specific license issued before October 1, 1996, which is of a type described in K.A.R. 28-35-180a (e)(5) shall submit a decommissioning funding plan as described in K.A.R. 28-35-180a (e)(8) or a certification of financial assurance for decommissioning. The plan or certification shall be submitted to the department, in accordance with the criteria set forth in this regulation, not later than 90 days after October 1, 1996.

(7) The amounts of financial assurance required for decommissioning, by quantity of material, shall be set out in Table I.

TABLE I

Financial Assurance for Decommissioning by Quantity of Material

Where the possession limit is greater than 10^4 but less than or equal to 10^5 times the applicable quantities in K.A.R. 28-35-201, Schedule F, regulations in unsealed form	$750,000.00
Where a combination of isotopes exist, if R, as defined in K.A.R. 28-35-180a (e)(4), divided by 10^4 is greater than 1, but R divided by 10^5 is equal to or less than one.....	$750,000.00
Where the possession limit is greater than 10^3 but less than or equal to 10^4 times the applicable quantities of K.A.R. 28-35-201, Schedule F, in unsealed form...	$150,000.00
For a combination of isotopes, if R, as defined in K.A.R. 28-35-180a (e)(4), divided by 10^3 is greater than one, but R divided by 10^4 is less than or equal to one	$150,000.00
Where the possession limit is greater than 10^{10} times the applicable quantities in K.A.R. 28-35-201, Schedule F, in sealed sources or foils	$75,000.00
For a combination of isotopes, if R, as defined in K.A.R. 28-35-180a (e)(4), divided by 10^{10} is greater than one.....	$75,000.00

(8) Each decommissioning funding plan shall contain the following:

(A) a cost estimate for decommissioning;

(B) a description of the method of assuring funds for decommissioning, selected from the methods available under K.A.R. 28-35-180a (e)(9);

(C) a description of the means for periodically adjusting cost estimates and associated funding levels over the life of the facility;

(D) a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning; and

(E) a signed original of the financial instrument obtained to satisfy the requirements of K.A.R. 28-35-180a (e)(9).

(9) Each licensee shall provide financial assurance for decommissioning by one or more of the following methods.

(A) Prepayment. ''Prepayment'' means a deposit of cash or liquid assets which is made:

(i) prior to the start of operation into an account which is segregated from the licensee's assets and outside of the licensee's administrative control; and

(ii) in an amount which would be sufficient to pay decommissioning costs.

The prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.

(B) A surety method, insurance, or other guarantee method. The licensee may use a surety, insurance, or other similar means to guarantee that decommissioning costs will be paid. A surety method may be in the form of a surety bond, letter of credit, or line of credit. A parent company guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test meet the requirements of K.A.R. 28-35-203, Schedule G. A parent company guarantee shall not be used in combination with other financial methods to satisfy these requirements. A guarantee of funds by the applicant or licensee for decommissioning costs based on a financial test may be used if the guarantee and test meet the requirements of K.A.R. 28-35-203, Schedule G. A guarantee by the applicant or licensee shall not be used in combination with any other financial methods to satisfy these requirements or in any situation where a parent company of the applicant or licensee holds majority control of the voting stock of the company. Any surety method or insurance used to provide financial assurance for

decommissioning shall contain the following conditions:

(i) The surety or insurance shall be open-ended, or if written for a specified term shall be renewed automatically unless 90 days or more prior to the renewal date the insurer notifies the department, the beneficiary, and the licensee of its intention not to renew. The surety or insurance shall also provide that the full face amount will be paid to the beneficiary automatically prior to the expiration without proof of forfeiture if the licensee fails to provide a replacement acceptable to the department within 30 days after receipt of notification of cancellation.

(ii) The surety or insurance shall be payable to a trust established for decommissioning costs. The trustee and trust shall be acceptable to the department. An acceptable trustee may include an appropriate state or federal agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency.

(iii) The surety or insurance shall remain in effect until the department has terminated the license.

(C) External sinking fund. A licensee may provide financial assurance for decommissioning through an external sinking fund in which deposits are made at least annually, coupled with a surety or insurance. The value of the surety or insurance may decrease by the amount accumulated in the sinking fund. ''External sinking fund'' means a fund:

(i) established and maintained by setting aside funds periodically in an account segregated from the licensee's assets and outside the licensee's administrative control; and

(ii) in which the total amount of the funds would be sufficient to pay decommissioning costs at the time termination of the operation is expected. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities. The surety or insurance provisions shall meet the requirements of K.A.R. 28-35-180a (e)(9)(B).

(D) In the case of federal, state or local government licensees, a statement of intent containing a cost estimate for decommissioning or an amount based on Table I of this regulation, and indicating that funds for decommissioning will be obtained when necessary.

(10) Each person licensed under K.A.R. 28-35-180a (e)(4), (5), (6), (7), (8), (9) and (10) shall keep records of all information that is important to the safe and effective decommissioning of the facility. The records shall be kept in an identified location until the license is terminated by the department. If records of relevant information are kept for other purposes, the licensee may refer to these records in the records kept pursuant to this paragraph and their locations. Information that is important to decommissioning shall consist of information required in paragraphs (A), (B), (C), and (D) below.

(A) Each licensee shall maintain records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. These records may be limited to records of instances in which contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas. These records shall include any known information identifying the nuclides, quantities, forms, and concentrations involved in the spill or occurrence.

(B) Each licensee shall maintain drawings of the following, both as originally built and as modified if applicable:

(i) structures and equipment in restricted areas where radioactive materials are used, stored or both; and

(ii) locations of possible inaccessible contamination. If the licensee references required drawings other than those kept pursuant to this regulation, the licensee shall not be required to index each relevant document individually. If drawings are not available, the licensee shall substitute appropriate records of available information concerning these areas and locations;

(C) Each licensee shall maintain a list, contained in a single document and updated every two years, of the following:

(i) all areas designated and formerly designated as restricted areas;

(ii) all areas outside of restricted areas that require documentation pursuant to K.A.R. 28-35-180a (e)(10)(A);

(iii) all areas outside of restricted areas where current and previous wastes have been buried as documented under K.A.R. 28-35-227j; and

(iv) all areas outside of restricted areas which contain material such that, if the license expired, the licensee would be required to either decontaminate the area to unrestricted release levels or

apply for approval for disposal under K.A.R. 28-35-225a.

Those areas containing sealed sources only shall not be included in the list, if the sources have not leaked, no contamination remains in the area after any leak, or the area contains only radioactive materials having half-lives of less than 65 days.

(D) Each licensee shall maintain records of the cost estimate performed for the decommissioning funding plan or of the amount certified for decommissioning, and records of the funding method used for assuring funds if either a funding plan or certification is used.

(f) Each applicant for a specific license shall make arrangements for a long-term care fund pursuant to K.S.A. 48-1623. Each applicant for any of the following specific licenses shall establish the long-term fund prior to the issuance of the license or prior to the termination of the license if the applicant chooses, at the time of the licensure, to provide a surety in lieu of a long-term care fund:

(1) waste-handling licensees;

(2) source material milling licensees; and

(3) facilities formerly licensed by the U.S. atomic energy commission or the U.S. nuclear regulatory commission, if required.

(g)(1) Each applicant shall agree to notify the department, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of title 11, bankruptcy, of the United States code by or against any of the following:

(A) the licensee;

(B) any entity, as that term is defined in 11 U.S.C. 101 (14) as of January 28, 1991, controlling the licensee or listing the license or licensee as property of the estate; or

(C) any affiliate, as that term is defined in 11 U.S.C. 101 (2) as of January 28, 1991, of the licensee.

(2) The bankruptcy notification shall indicate:

(A) the bankruptcy court in which the petition for bankruptcy was filed; and

(B) the date the petition was filed. (Authorized by and implementing K.S.A. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Sept. 20, 1993; amended Nov. 1, 1996.)

28-35-181. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-181a. **Specific licenses for materials, human use of radioactive material in medical institutions.** An application for a specific license for human use of radioactive material in institutions shall not be approved unless:

(a) The applicant has appointed a radiation safety committee of at least three members to oversee the licensed radioactive material throughout the institution and to review the institution's radiation safety program. Membership of the committee shall include at least the following: an authorized user for each type of use permitted by the license, a representative of the nursing staff, a representative of the institution's management, and a radiation safety officer;

(b) the applicant possesses adequate facilities for the clinical care of patients;

(c) the physician or physicians designated on the application as the user or users have substantial experience in handling and administering radioactive materials, and where applicable, clinical management of radioactive patients; and

(d) if the application is for a license to use unspecified quantities or multiple types of radioactive material, the applicant or applicant's staff has substantial experience in the use of a variety of radioactive materials for a variety of human uses. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181b. **Specific licenses to individual physicians for human use of radioactive material.** (a) A specific license for the human use of radioactive materials outside of a medical institution shall not be issued to an individual physician unless:

(1) The applicant has access to a hospital and adequate facilities are available for the hospitalization and monitoring of the applicant's radioactive patients when such action is advisable; and

(2) the applicant has extensive experience in the proposed use, handling and administration of radioactive material, and where applicable, clinical management of radioactive patients. The physician shall furnish evidence of this experience with the application for the specific license.

(b) The secretary shall not approve an application by an individual physician or group of physicians for a specific license to receive, possess, or use radioactive material on the premises of a medical institution unless:

(1) The use of radioactive material is limited to:

(A) The administration of radiopharmaceuticals for diagnostic or therapeutic purposes;

(B) the performance of diagnostic studies on patients to whom a radiopharmaceutical has been administered;

(C) the performance of in vitro diagnostic studies; and

(D) calibration and quality control checks of radioactive assay instrumentation, radiation safety instrumentation and diagnostic instrumentation;

(2) the physician brings the radioactive material to the institution for each use and removes the radioactive material from the institution after each use; and

(3) the medical institution or institutions at which the radioactive materials are to be used by the physician or physicians do not hold a specific license under K.A.R. 28-35-181a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181c. **Specific license for human use of radioactive material in sealed sources.** (a) A specific license for human use of radioactive materials in sealed sources shall not be issued unless the applicant, or if the application is made by an institution, each individual user of the radioactive material:

(1) Has specialized training in the diagnostic or therapeutic use of the sealed source device or extensive experience in the use of the device; and

(2) is a physician.

(b) The applicant shall furnish evidence of the training or experience required by subsection (a) at the time of filing the application for the specific license. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181d. **Specific licenses for a group or groups of medical uses.** (a) Any institution, person or group of persons who meet the requirements of K.A.R. 28-35-181a or 28-35-181b may file a written application with the secretary for a specific license to use radioactive material for any group or groups of medical uses specified in K.A.R. 28-35-199a. Each such application shall meet the requirements of K.A.R. 28-35-179a and shall designate the intended group or groups of uses for the radioactive material.

(b) An application for a specific license to use radioactive material for any group or groups of medical uses specified in K.A.R. 28-35-199a schedule shall not be approved unless:

(1) The applicant, or the physician or physicians designated in the application as the individual user or users, has adequate clinical experience in performing the medical use or uses for which application is made;

(2) the applicant's proposed radiation detection instrumentation is adequate for conducting the medical procedures specified in the group or groups of uses for which application is made;

(3) the applicant's radiation safety operating procedures are adequate for the proper handling and disposal of radioactive material involved in the group or groups of uses for which application is made; and

(4) the applicant, or the physician or physicians designated in the application as the individual user or users, and all other personnel who will be involved in the preparation and use of the radioactive material, have adequate training and experience in the handling of radioactive material. Such training and experience shall be appropriate for the conduct of the uses included in the group or groups of uses for which application is made.

(c) Each licensee who is licensed under this regulation shall be subject to the following limitations:

(1) Each licensee who has been issued a license for group I, II, IV, or V uses shall not receive, possess, or use radioactive material, except those radiopharmaceuticals manufactured in the form to be administered to the patient, and labeled, packaged, and distributed in accordance with a specific license issued by the secretary, or the United States nuclear regulatory commission or an agreement state.

(2) Each licensee who has been issued a license for group III uses shall not receive, possess, or use generators or reagent kits containing radioactive material, nor shall any licensee use reagent kits that do not contain radioactive material to prepare radiopharmaceuticals containing radioactive material, except:

(i) Reagent kits not containing radioactive material that are approved by the secretary, the United States nuclear regulatory commission or an agreement state for use by persons licensed pursuant to this regulation for group III medical uses; or

(ii) Generators or reagent kits containing radioactive material that are manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(3) Each licensee who has been issued a license for group III uses and who uses generators or reagent kits shall elute the generator or process radioactive material with the reagent kit in accordance with instructions that are approved by the secretary, the United States nuclear regulatory commission or an agreement state and furnished by the manufacturer on the label attached to, or in the leaflet or brochure that accompanies, the generator or reagent kit.

(4) Each licensee who has been issued a license for groups I, II, or III uses and who uses the radioactive material for clinical procedures other than those specified in the product labeling or package insert shall comply with the product labeling regarding:

(i) Chemical and physical form;

(ii) route of administration; and

(iii) dosage range.

(5) Each licensee who has been issued a license for group IV uses shall not receive, possess, or use radioactive material unless contained in a source or device that has been manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(d) Each licensee who is licensed under this regulation shall be authorized to use radioactive material under the general license issued in K.A.R. 28-35-178h for the specified in vitro uses, without filing form RH-31 as otherwise required by that regulation. However, the licensee shall be subject to the other requirements of K.A.R. 28-35-178h.

(e) Any licensee who is licensed under this regulation shall be authorized, subject to the provisions of subsections (f) and (g) of this regulation, to receive, possess, and use for calibration and reference standards:

(1) Any radioactive material listed in groups I, II, or III of K.A.R. 28-35-199a that has a half-life of 100 days or less, in amounts not exceeding 15 millicuries;

(2) any radioactive material listed in group I, II, or III of K.A.R. 28-35-199a that has a half-life greater than 100 days, in amounts not exceeding 200 microcuries;

(3) technetium-99m, in amounts not exceeding 30 millicuries; and

(4) any radioactive material, in amounts not exceeding three millicuries per source, contained in calibration or reference sources that have been manufactured, labeled, packaged, and distributed in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state.

(f)(1) Any licensee who possesses sealed sources as calibration or reference sources pursuant to subsection (e) of this regulation shall cause each sealed source containing radioactive material, other than hydrogen 3, that has a half-life greater than 30 days, and that is in any form other than gas, to be tested for leakage, contamination or both at intervals not exceeding six months. In the absence of a certificate from a transferor indicating that a leak test has been made within six months prior to the transfer of a particular sealed source, that sealed source shall not be used until tested, unless:

(A) The source contains 100 microcuries or less of beta, gamma, or beta and gamma-emitting material, or 10 microcuries or less of alpha-emitting material; or

(B) the sealed source is stored and is not being used.

(2) Each leak test required under paragraph (1) of this subsection shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from sealed source or from the surfaces of the device in which the sealed source is permanently mounted or stored and on which contamination might be expected to accumulate. Records of leak test results shall be kept in units of microcuries and shall be maintained for inspection by the department.

(3) If the leak test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired, or to be disposed of in accordance with parts 3 and 4 of these regulations. A report shall be filed with the secretary within five days of the test, describing the equipment involved, the test results, and the corrective action taken.

(g) Each licensee who possesses and uses calibration and reference sources pursuant to subsection (e) of this regulation shall:

(1) Follow radiation safety and handling instructions that are approved by the secretary, the United States nuclear regulatory commission or an agreement state and furnished by the manufacturer on the label attached to the source, or permanent container thereof, or in the leaflet or brochure that accompanies the source;

(2) maintain the instructions referenced in paragraph (1) of this subsection in a legible and conveniently available form; and

(3) conduct a quarterly physical inventory to account for all sources received and possessed. Records of the inventories shall be maintained for inspection by the department and shall include the quantities and kinds of radioactive material, location of sources, and the date of the inventory. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181e. **Special licenses for certain items containing radioactive material other than source, by-product or special nuclear material.** (a) Applications for any of the following types of specific licenses shall not be approved unless the applicant submits the information required by 10 CFR, section 32.14 and 32.15, as in effect on May 1, 1983:

(1) a specific license to apply radioactive material other than source, by-product or special nuclear material to products specified in K.A.R. 28-35-192c(a);

(2) a specific license to incorporate radioactive material, other than source, by-product or special nuclear material into products specified in K.A.R. 28-35-192c(a); and

(3) a specific license to import products that are specified in K.A.R. 28-35-192c(a), and that contain radioactive material other than source, by-product or special nuclear material for use pursuant to K.A.R. 28-35-192a(b).

(b)(1) Each person licensed under subsection (a) of this regulation shall file an annual report with the secretary regarding items transferred to other persons for use under K.A.R. 28-35-192c(a). That report shall include:

(A) A description or identification of the type of each product transferred;

(B) for each radionuclide in each type of product, the total quantity of the radionuclide transferred; and

(c) the number of units of each type of product transferred during the reporting period.

(2) If no transfers of by-product material have been made pursuant to K.A.R. 28-35-192c(a) during a reporting period, the report shall indicate this fact.

(3) Each report shall cover the 12-month period commencing on July 1 and ending on June 30, and shall be filed by July 31 of each year. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181f. **Special licenses for the introduction of radioactive material into products in exempt concentrations.** (a) An application for a specific license to introduce radioactive material into a product or material and to transfer the product or material to any person who is exempt from regulation under K.A.R. 28-35-192b(a) shall not be approved unless the applicant submits with the application for the specific license:

(1) A description of the product or material into which the radioactive material is to be introduced;

(2) an explanation of the intended use of the radioactive material;

(3) the method by which the radioactive material is to be introduced;

(4) the concentration of the radioactive material to be introduced;

(5) the control method or methods to be employed to assure that no more than the specified concentration is introduced;

(6) the estimated time interval between introduction of radioactive material into the product or material and the transfer of the product or material;

(7) the estimated concentration of radioactive material that will be present in the product or material at the time of transfer; and

(8) reasonable assurances that:

(A) the concentrations of radioactive material at the time of transfer will not exceed the limitations prescribed in K.A.R. 28-35-198a, Schedule C;

(B) reconcentration of the radioactive material concentrations exceeding the limitations prescribed in K.A.R. 28-35-198a, Schedule C is not likely to occur;

(C) use of lower concentrations of radioactive material is not practical or feasible; and

(D) the product or material is not likely to be incorporated in any food, beverage, cosmetic, drug or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

(b)(1) Each person licensed under subsection (a) of this regulation shall file an annual report with the secretary describing the type and quantity of each product or material into which radioactive material has been introduced during the reporting period; the name and address of the person to whom possession of the product of material into which radioactive material has been introduced was transferred; the type and quantity of radioactive material which was introduced into each product or material; and the initial concentration of radioactive material in the product or material at time of transfer of the radioactive material by the licensee.

(2) If no transfers of radioactive materials have been made during a reporting period, the report shall indicate this fact.

(3) Each report shall cover the 12-month period commencing on July 1 of each year. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181g. **Special licenses for use of sealed sources in industrial radiography.** (a) An application for a specific license to use sealed sources in industrial radiography shall not be approved unless the applicant:

(1) Has a program for training radiographers and radiographer's assistants which meets the requirements of K.A.R. 28-35-282;

(2) has established, and submits to the department, written operating and emergency procedures meeting the requirements of K.A.R. 28-35-283;

(3) has an internal inspection system to assure that the regulations, license conditions, and the applicant's operating and emergency procedures are followed by radiographers and radiographers' assistants;

(4) submits to the department a description of the overall organizational structure pertaining to the radiographic program, including specific delegations of authority and responsibility for operation of the program;

(5) if the applicant desires to conduct leak tests, has established adequate procedures to be followed in leak-testing sealed sources for possible leakage and contamination, and submits to the department a description of these procedures including:

(A) Instrumentation to be used;

(B) method of performing tests, including points on equipment to be smeared and the method of taking smears; and

(C) pertinent experience of the person who will perform the test; and

(6) has established a program for inspection and maintenance of radiographic exposure devices and storage containers to assure proper functioning.

(b) Inspections required by paragraph (a)(3) of this regulation shall be performed at intervals not exceeding three months. The records of each such inspection shall be retained for inspection by the department for a period of two years from the date the inspection is performed. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181h. **Specific licenses to manufacture and distribute the devices specified in K.A.R. 28-35-178b**. An application for a specific license to manufacture and distribute one or more of the devices described in K.A.R. 28-35-178b shall not be approved unless the applicant meets the requirements of subsection (a) and (b) of this regulation. (a) The applicant shall submit sufficient information relating to the design, manufacture, prototype testing, quality control, labels, proposed uses, installation, servicing, leak testing, operating and safety instructions, and potential hazards of the device to provide reasonable assurance that:

(1) The device can be safely operated by persons not having training in radiological protection;

(2) under ordinary conditions of handling, storage, and use of the device, the radioactive material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that any person will receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in K.A.R. 28-35-212a; and

(3) under accident conditions, such as fire or explosion, associated with handling, storage, and use of the device, it is unlikely that any person

would receive an external radiation dose or dose commitment in excess of the following organ doses:

(A)	Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye	15 rems
(B)	Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 square centimeter	200 rems
(C)	Other organs	50 rems.

(b) Each device shall bear a durable, legible, clearly visible label or labels approved by the department, which contain, in clearly identified and separate statements, the following information:

(1) Instructions and precautions necessary to assure safe installation, operation, and servicing of the device (operating and service manuals may be identified in the label and used to provide this information);

(2) whether or not leak testing or testing of any on-off mechanism and indicator is required. The statements shall include the maximum allowable time intervals between tests and shall identify the radioactive material by isotope, quantity of radioactivity, and date that the quantity was determined; and

(3) the information called for in one of the following statements, as appropriate, in the same or a substantially similar form;

(A) "The receipt, possession, use, and transfer of this device, model _____, serial no. _____, are subject to a general license or the equivalent and the regulations of the U.S. nuclear regulatory commission or a state with which the U.S. nuclear regulatory commission has entered into an agreement for the exercise of regulatory authority. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited.

CAUTION—RADIOACTIVE MATERIAL

_____

(Name of manufacturer or distributor);"

or

(B) "The receipt, possession, use, and transfer of this device, model _____, serial no. _____, are subject to a general license or the equivalent, and the regulations of a licensing state. This label shall be maintained on the device in a legible condition. Removal of this label is prohibited.

CAUTION—RADIOACTIVE MATERIAL

_____

(Name of manufacturer or distributor)"

The model, serial number, and name of the manufacturer or distributor may be omitted from this label if the information is elsewhere specified in labeling affixed to the device. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181i. **Special license to manufacture, distribute, assemble or repair luminous safety devices for use in aircraft.** An application for a specific license to manufacture, assemble, or repair luminous safety devices containing tritium or promethium-147, for use in aircraft, and to distribute such devices to persons generally licensed under K.A.R. 28-35-178c shall not be approved unless the applicant meets the requirements of sections 32.53, 32.54, 32.55, 32.56 and 32.101 of 10 CFR Part 32, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181j. **Special licenses to manufacture and distribute calibration sources containing americium-241 or plutonium.** An application for a specific license to manufacture calibration sources containing americium-241 or plutonium and to distribute those sources to persons generally licensed under K.A.R. 28-35-178e shall not be approved unless the applicant meets the requirements of sections 32.57, 32.58, 32.59 and 32.102 of 10 CFR Part 32, as in effect on May 31, 1984, and the requirements of section 70.39 of 10 CFR Part 70, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181k. **Specific licenses to manufacture and distribute ice detection devices.** An application for a specific license to manufacture ice detection devices and to distribute those devices to persons generally licensed under K.A.R. 28-35-178g shall not be approved unless the applicant meets the requirements of sections 32.61, 32.62, and 32.103 of 10 CFR Part 32, as in effect on May 31, 1984. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181*l*. **Specific licenses to manufacture and distribute industrial products and devices containing depleted uranium.** (a) An application to manufacture industrial products and devices containing depleted uranium for mass-volume applications and to distribute those products or devices to persons generally licensed under K.A.R. 28-35-177a(c) shall not be approved unless:

(1) The applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling or marking, proposed uses, and potential hazards of the industrial product or device to provide reasonable assurance that possession, use, or transfer of the depleted uranium in the product or device is not likely to cause any individual to receive, in any one calendar quarter, a radiation dose in excess of 10 percent of the limits specified in K.A.R. 28-35-212a;

(2) the applicant submits sufficient information regarding the industrial product or device and the presence of depleted uranium for a mass-volume application in the product or device to provide reasonable assurance that unique benefits will accrue to the public because of the usefulness of the product or device;

(3) the secretary finds the product or device combines a high degree of utility with a low probability of uncontrolled disposal or dispersal of significant quantities of depleted uranium into the environment; and

(4) the application states clearly the use or uses for which the product or device is to be intended.

(b) Each person licensed pursuant to subsection (a) of this regulation shall:

(1) In the manufacture of the industrial product or device, and in the installation of the depleted uranium into the product or device, maintain the level of quality control required by the license;

(2) label or mark each unit to:

(A) Identify the manufacturer of the product or device and the number of the license under which the product or device was manufactured, identify the fact that the product or device contains depleted uranium, and indicate the quantity of depleted uranium in each product or device; and

(B) state that the receipt, possession, use, and transfer of the product or device are subject to a general license and the regulations issued by the secretary, the U.S. nuclear regulatory commission or an agreement state;

(3) assure that the depleted uranium, before being installed in each product or device, has been impressed with the following legend clearly legible through any plating or other covering: "depleted uranium";

(4)(A) furnish a copy of K.A.R. 28-35-177a and a form RH-85 to each person to whom the applicant transfers depleted uranium in a product or device for use pursuant to the general license issued in K.A.R. 28-35-177a(c); or

(B) furnish to each person to whom the applicant transfers depleted uranium in a product or device for use pursuant to a general license issued by the U.S. nuclear regulatory commission or an agreement state:

(i) a copy of the regulation of the U.S. nuclear regulatory commission or an agreement state which is equivalent to K.A.R. 28-35-177a(c) and a copy of the certificate of the U.S. nuclear regulatory commission or agreement state;

(ii) a copy of K.A.R. 28-35-177a and a copy of form RH-85; and

(iii) a note explaining that use of the product or device is regulated by the U.S. nuclear regulatory commission or an agreement state under requirements substantially the same as those in K.A.R. 28-35-177a;

(5) report to the department all transfers of industrial products or devices to another person for use under the general license issued in K.A.R. 28-35-177a(c). This report shall identify each general licensee by name and address; an individual, by name and position, if any, who may constitute a point of contact between the department and the general licensee; the type and model number of device transferred; and the quantity of depleted uranium contained in the product or device. A report shall be submitted within 30 days after the end of each calendar quarter. If no transfers have been made to persons generally licensed under K.A.R. 28-35-177a(c) during the reporting period, the report shall indicate this fact;

(6)(A) report to the U.S. nuclear regulatory commission all transfers of industrial products or devices to persons for use under a U.S. nuclear regulatory commission general license which is equivalent to K.A.R. 28-35-177a(c);

(B) report to the appropriate state agency of each agreement state all transfers of devices manufactured and distributed pursuant to this regulation for use under a general license issued by that particular agreement state; and

(C) identify in each report required under paragraph (6)(A) or (6)(B) of this subsection each general licensee by name and address; an individual, by name and position, if any, who may constitute a point of contact between the commission or state agency and the general licensee; the type and model number of the device transferred; and the quantity of depleted uranium contained in the product or device. The report shall be submitted

within 30 days after the end of each calendar quarter. If no transfers are made to U.S nuclear regulatory commission licensees during any reporting period, this information shall be reported to the U.S. nuclear regulatory commission. If no transfers are made to general licensees within a particular agreement state during the reporting period, this information shall be reported to the appropriate agency of the agreement state;

(7) keep and maintain, for a period of two years, records showing the name, address, and point of contact for each general licensee to whom a transfer of depleted uranium in industrial products or devices has been made, including the date of the transfer and the quantity of depleted uranium in the product or device transferred; and

(8) keep and maintain for a period of two years, records showing compliance with the reporting requirements of this subsection. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181m. **Specific licenses to manufacture and distribute radiopharmaceuticals containing radioactive material for medical use under group licenses.** An application for a specific license to manufacture and distribute radiopharmaceuticals containing radioactive material, for uses listed in Group I, II, III, IV or V of 28-35-199a Schedule D and to be used by persons licensed under K.A.R. 28-35-181d(u) of this chapter, shall be approved if the applicant meets the requirements of subsection (a), (b), (c) and (d) of this regulation.

(a) The applicant shall satisfy the general requirements specified in 28-35-180a.

(b) The applicant shall submit evidence that:

(1) The radiopharmaceutical containing radioactive material is subject to the federal food, drug and cosmetic act or the public health service act and will be manufactured, labeled, and packaged in accordance with a new drug application (NDA) approved by food and drug administration (FDA), a biologic product license issued by FDA, or a ''notice of claimed investigational exemption for a new drug'' (IND) accepted by FDA; or

(2) The manufacture and distribution of the radiopharmaceutical containing radioactive material is not subject to the federal food, drug, and cosmetic act or the public health service act.

(c) The applicant shall submit information on the radionuclide, the chemical and physical form of the material; packaging, including maximum activity per package; and evidence that the shielding provided by the packaging of the radioactive material is appropriate for safe handling and storage of radiopharmaceuticals by group licensees.

(d) The label affixed to each package of the radiopharmaceutical shall contain information on the radionuclide, quantity, and date of assay. The label affixed to each package, or the leaflet or brochure which accompanies each package, shall contain a statement that the radiopharmaceutical is licensed by the department for distribution to persons licensed pursuant to K.A.R. 28-35-181d for K.A.R. 28-35-199a, schedule D, Group I, Group II, Group IV, or Group V uses as appropriate, or under equivalent licenses of other agreement states or the United States nuclear regulatory commission. The labels, leaflets or brochures required by this regulation shall be in addition to the labeling required by the FDA. Such labels, leaflets or brochures may be separate from the FDA labeling, or with the approval of the FDA, the labeling may be combined with the labeling required by the FDA. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181n. **Specific licenses to manufacture and distribute generators or reagent kits for preparation of radiopharmaceuticals containing radioactive material.** An application for a specific license to manufacture and distribute generators or reagent kits containing radioactive material for preparation of radiopharmaceuticals by persons licensed pursuant to K.A.R. 28-35-181d for the uses listed in Group III of K.A.R. 28-35-199a, Schedule D, shall be approved if the applicant meets the requirements of subsections (a), (b), (c) and (d) of this regulation.

(a) The applicant shall satisfy the general requirements specified in K.A.R. 28-35-180a.

(b) The applicant shall submit evidence that:

(1) The generator or reagent kit is subject to the federal food, drug and cosmetic act or the public health service act and will be manufactured, labeled, and packaged in accordance with a new drug application (NDA) approved by the food and drug administration (FDA), a biologic product license issued by FDA, or a ''notice of claimed investigational exemption for a new drug'' (IND) accepted by FDA; or

(2) the manufacture and distribution of the generator or reagent kit is not subject to the federal food, drug, and cosmetic act and the public health service act.

(c) The applicant shall submit information on the radionuclide, the chemical and physical form of the material; packaging, including maximum activity per package; and shielding provided by the packaging of the radioactive material contained in the generator or reagent kit.

(d) The label affixed to the generator or reagent kit shall contain information on the radionuclide, quantity, and date of assay.

(e) The label affixed to the generator or reagent kit, or the leaflet or brochure which accompanies the generator or reagent kit, shall contain:

(1) Adequate information, from a radiation safety standpoint, on the procedures to be followed and the equipment and shielding to be used in eluting the generator or processing radioactive material with the reagent kit; and

(2) a statement that "this generator or reagent kit (as appropriate) is approved for use by persons licensed by the department pursuant to K.A.R. 28-35-181d for Group III uses under K.A.R. 28-35-199a, Schedule D, Group III of Part 3, or under equivalent licenses of the United States nuclear regulatory commission or another agreement state." The labels, leaflets or brochures required by this paragraph shall be in addition to the labeling required by the FDA. Such labels, leaflets or brochures may be separate from FDA labeling, or with the approval of FDA, the labeling may be combined with the labeling required by the FDA. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181o. **Specific licenses to manufacture and distribute sources and devices for use as a calibration or reference source, or for certain medical uses.** (a) An application for a specific license to manufacture and distribute sources and devices containing radioactive material to persons licensed under K.A.R. 28-35-181d for use as a calibration or reference source or for one or more of the uses listed in Group VI of K.A.R. 28-35-199a shall not be approved unless the applicant submits the following information regarding each type of source or device:

(1) The radioactive material contained, its chemical and physical form, and amount;

(2) details of design and construction of the source or device;

(3) procedures for, and results of, prototype tests to demonstrate that the source or device will maintain its integrity under stresses likely to be encountered in normal use and in accidents;

(4) for devices containing radioactive material, the radiation profile for a prototype device;

(5) details of quality control procedures to assure that production sources and devices meet the standards of the design and prototype tests;

(6) procedures and standards for calibrating sources and devices;

(7) legend and methods for labeling sources and devices as to their radioactive content;

(8) radiation safety instructions for handling and storing the source or device. These instructions shall be included on a durable label attached to the source or device. However, instructions which are too lengthy for the label may be summarized on the label and printed in detail on a brochure which is referenced on the label; and

(9) the label which is to be affixed to the source or device, or to the permanent storage container for the source or device. The label shall contain information on the radionuclide, quantity, and date of assay, and a statement that the source or device is licensed by the department for distribution to persons licensed under K.A.R. 28-35-181d or under an equivalent license of the U.S. nuclear regulatory commission or an agreement state. Labeling for sources which do not require long term storage may be on a leaflet or brochure which is to accompany the source.

(b) (1) If the applicant desires that the source or device is required to be tested for leakage of radioactive material at intervals longer than six months, the applicant shall include in the application sufficient information to demonstrate that the longer interval is justified by performance characteristics of the source or device, or similar sources or devices, and by design features that have a significant bearing on the probability or consequences of leakage of radioactive material from the source.

(2) In determining the acceptable interval between tests for leakage of radioactive material, the secretary shall consider information that includes:

(A) the nature of the primary containment (source capsule);

(B) the method for protection of the primary containment;

(C) the method of sealing the containment;

(D) containment construction materials;

(E) the form of the contained radioactive material;

(F) the maximum temperature withstood during prototype tests;

(G) the maximum pressure withstood during prototype tests;

(H) the maximum quantity of contained radioactive material;

(I) the radiotoxicity of contained radioactive material; and

(J) the applicant's operating experience with identical sources or devices or similarly designed and constructed sources or devices. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181p. **Specific license to manufacture or distribute radioactive material for use by persons generally licensed under K.A.R. 28-35-178h.** An application for a specific license to manufacture or distribute, or to manufacture and distribute radioactive material for use by persons generally licensed under K.A.R. 28-35-178h, shall not be approved unless the applicant meets the requirements of subsections (a),(b),(c), and (d) of this regulation.

(a) The radioactive material shall be prepared for distribution in prepackaged units of:

(1) iodine-125 in units not exceeding 10 microcuries each;

(2) iodine-131 in units not exceeding 10 microcuries each;

(3) carbon-14 in units not exceeding 10 microcuries each;

(4) hydrogen-3 (tritium) in units not exceeding 50 microcuries each;

(5) iron-59 in units not exceeding 20 microcuries each;

(6) selenium-75 in units not exceeding 10 microcuries each;

(7) mock iodine-125 in units not exceeding 0.05 microcuries of iodine-129 and 0.005 microcuries of americum-241; or

(8) cobalt-57 in units not exceeding 10 microcuries each.

(b) Each prepackaged unit shall bear a durable clearly visible label:

(1) identifying the radioactive contents as to chemical form and radionuclide, and indicating that the amount of radioactivity does not exceed:

(A) 10 microcuries of iodine-125, iodine-131, carbon-14, cobalt-57, or selenium-75;

(B) 50 microcuries of hydrogen-3 (tritium);

(C) 20 microcuries of iron-59; or

(D) 0.05 microcurie of iodine-129 and 0.005 microcurie of americium-241 each; and

(2) Displaying the radiation caution symbol described in K.A.R 28-35-219a and the words, ''CAUTION—RADIOACTIVE MATERIAL'', and ''not for internal or external use in humans or animals''.

(c) The following statement, or a substantially similar statement, shall appear on a label affixed to each prepackaged unit, or in a leaflet or brochure to accompany the package:

''The radioactive material may be received, acquired, possessed, and used only by physicians, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the United States nuclear regulatory commission or of a state with which the commission has entered into an agreement for the exercise of regulatory authority.

_____

Name of manufacturer''

(d) The label to be affixed to the unit, or a leaflet or brochure which is to accompany the package, shall contain information concerning the precautions to be observed in handling and storing the radioactive material and regarding the waste disposal requirements of K.A.R. 28-35-223a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181q. **Special licenses concerning gas and aerosol detectors containing radioactive material other than by-product, source or special nuclear material.** (a) An application for a specific license to manufacture, process, produce or transfer gas and aerosol detectors which contain radioactive material other than source, by-product, or special nuclear material, and which are designed to protect life or property from fires and airborne hazards, shall not be approved unless the applicant submits the information required by the United States nuclear regulatory commission under 10 CFR sections 32.26 and 32.27, as in effect on March 31, 1983, for similar devices containing by-product material.

(b) Each person issued a license under subsection (a) of this regulation shall:

(1) develop and carry out adequate control procedures in the manufacture of the product to assure that each production lot meets quality control standards approved by the department;

(2) agree to label or mark each unit so that the manufacturer of the product and the radioactive material in the product can be identified and provide other information with each unit that may be required by the department, including disposal instruction when appropriate; and

(3) agree to file an annual report with the department, which shall include the following information on products imported for sale or distribution or transferred to other persons for use under K.A.R. 28-35-192a or an equivalent regulation of the United States nuclear regulatory commission or an agreement state:

(A) A description or identification of the type of each product imported or transferred;

(B) for each radionuclide in each type of product, the total quantity of the radionuclide imported or transferred; and

(C) the number of units of each type of product imported or transferred during the reporting period. If no imports or transfers of radioactive material have been made during a reporting period, the report shall so indicate.

(c) The report required by paragraph (3) of subsection (b) of this regulation shall cover the 12-month period commencing on July 1, and ending on June 30, and shall be filed by July 31 of each year. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-181r. **Special licenses to manufacture, process, import, distribute or transfer certain radioactive material to persons exempt from regulation pursuant to K.A.R. 28-35-192a.** (a) An application for a specific license to manufacture, process, produce, import, package, repackage, or transfer quantities of radioactive material other than source, byproduct, or special nuclear material for commercial distribution to persons exempt from these regulations pursuant to K.A.R. 28-35-192a or an equivalent regulation of the United States nuclear regulatory commission or an agreement state shall not be approved unless the applicant submits the information required in 10 CFR sections 32.18 and 32.19, as in effect on March 31, 1983.

(b) Each person licensed under subsection (a) of this regulation shall maintain records identifying, by name and address, each person to whom the licensee transfers radioactive material and stating the kinds and quantities of radioactive material transferred. An annual summary report stating the total quantity of each isotope transferred shall be filed with the department. Each report shall cover the 12-month period commencing on July 1 and ending June 30 and shall be filed by July 31 of each year. If no transfers of radioactive material have been made during a reporting period, the report shall indicate this fact. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-182a. **Specific licenses of broad scope; types of specific licenses.** (a) A ''type A specific license of broad scope'' is a specific license which is issued to a person who meets the requirements of K.A.R. 28-35-182b and which authorizes that person to acquire, own, possess, use and transfer radioactive material in a quantity not exceeding the quantity specified in the license.

(b)(1) A ''type B specific license of broad scope'' is a specific license issued to a person who meets the requirements of K.A.R. 28-35-182c and which authorizes that person to acquire, own, possess, use and transfer a specified amount of one or more of the radionuclides listed in K.A.R. 28-35-200a.

(2) If only one radionuclide is acquired, owned, possessed, used and transferred, the quantity allowed under a type B specific license of broad scope shall be the quantity specified in column I of K.A.R. 28-35-200a.

(3) If two or more radionuclides are acquired, owned, possessed, used and transferred, the quantity of all the radionuclides allowed shall be determined as follows:

(A) Determine the ratio of the quantity of each radionuclide to the quantity of that radionuclide specified in column I of K.A.R. 28-35-200a.

(B) Add the ratios.

(C) The sum of those ratios shall not exceed unity.

(c)(1) A ''type C specific license of broad scope'' is a specific license which is issued to a person who meets the requirements of K.A.R. 28-35-182d and which authorizes that person to acquire, own, possess, use and transfer a specified

amount of one or more of the radionuclides listed in K.A.R. 28-35-200a.

(2) If only one radionuclide is acquired, owned, possessed, used and transferred, the quantity allowed under a type C specific license of broad scope shall be the quantity specified in column II of K.A.R. 28-35-200a.

(3) If two or more radionuclides are acquired, owned, possessed, used and transferred, the quantity of all radionuclides allowed shall be determined as follows:

(A) Determine the ratio of the quantity of each radionuclide to the quantity of that radionuclide specified in column II of K.A.R. 28-35-200a.

(B) Add the ratios.

(C) The sum of the ratios shall not exceed unity. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182b. **Qualifications for a type A specific license of broad scope.** A type A specific license of broad scope shall be issued only to an applicant who:

(a) has previously engaged in activities involving the use of radioactive materials. The applicant shall submit a summary of the previous activities that involved the use of radioactive materials; and

(b) has established administrative controls and provisions relating to organization and management, procedures, record-keeping, material control and accounting, and management review to assure safe operations. These controls shall include:

(1) The establishment of a radiation safety committee composed of a radiation safety officer, a representative of management, and persons trained and experienced in the safe use of radioactive material;

(2) the appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters; and

(3) the establishment of appropriate administrative procedures. These procedures shall assure that:

(A) the procurement and use of radioactive material is controlled;

(B) safety evaluations of proposed uses of radioactive material are completed. These evaluations shall take into consideration the adequacy of facilities and equipment, training and experience of the user, and proper operating or handling procedures; and

(C) prior to the use of the radioactive material, the safety evaluation of proposed uses, prepared in accordance with paragraph (3)(B) of this subsection, is reviewed, approved and recorded by the radiation safety committee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182c. **Qualifications for a type B specific license of broad scope.** A type B specific license of broad scope shall be issued only to an applicant who has established controls and provisions relating to organization and management, procedures, record-keeping, material control and accounting, and management review that are sufficient to assure safe operation. These controls and provisions shall include:

(a) The appointment of a radiation safety officer who is qualified by training and experience in radiation protection, and who is available for advice and assistance on radiation safety matters; and

(b) the establishment of appropriate administrative procedures. These procedures shall assure that:

(1) the procurement and use of radioactive material is controlled;

(2) safety evaluations of proposed uses of radioactive material are completed. Such evaluations shall take into consideration the adequacy of facilities and equipment, training and experience of the user, and proper operating or handling procedures; and

(3) prior to use of the radioactive material, the safety evaluation of proposed uses, prepared in accordance with paragraph (b)(2) of this regulation, is reviewed, approved, and recorded by the radiation safety committee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182d. **Qualifications for a type C specific license of broad scope.** A type C specific license of broad scope shall be issued only to an applicant who:

(a) submits a statement that radioactive material will only be used by, or under the direct supervision of, an individual or individuals who have:

(1) at least a bachelor's degree or equivalent training and experience in a physical or biological science or in engineering; and

(2) at least 40 hours of training and experience in the safe handling of radioactive materials, and in the characteristics of ionizing radiation, units of radiation dose and quantities, radiation detection instrumentation, and biological hazards of exposure to radiation. Such training and experience shall be appropriate to the type and forms of radioactive material to be used; and

(b) has established administrative controls and provisions relating to procurement of radioactive materials, procedures, record-keeping, material control and accounting, and management review to assure safe operations. These control provisions shall include appropriate administrative procedures which assure that:

(1) procurement and use of radioactive material is controlled; and

(2) safety evaluations of proposed uses of radioactive material are completed. Such evaluations shall take into consideration the adequacy of facilities and equipment and proper operating or handling procedures. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-182e. **Restrictions on specific licenses of broad scope.** (a) Any person who has been issued any type of specific license of broad scope shall not:

(1) Conduct tracer studies in the environment involving direct release of radioactive material;

(2) receive, acquire, own, possess, use, or transfer devices containing 100,000 curies or more of radioactive material as sealed sources used for irradiation of materials;

(3) conduct activities for which a particular specific license is required; or

(4) add, or cause the addition of, radioactive material to any food, beverage, cosmetic, drug, or other product designed for ingestion or inhalation by, or application to, a human being.

(b) Any radionuclide or radionuclides possessed under a type A specific license of broad scope shall be only used by, or under the direct supervision of, a person or persons approved by a licensee's radiation safety committee.

(c) Any radionuclide or radionuclides possessed under a type B specific license of broad scope shall be only used by, or under the direct supervision of, a person or persons approved by a licensee's radiological safety officer.

(d) Any radionuclide or radionuclides possessed under a type C specific license of broad scope shall be used only by, or under the direct supervision of, a person or persons who meet the requirements of K.A.R. 28-35-182d(a). (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-183. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-183a. **Conditions imposed upon any specific license.** (a) Upon determining that an application meets the requirements of the act and these regulations, the secretary shall issue a specific license authorizing the activity proposed by the applicant and may impose any limitations or conditions to the specific license as the secretary deems appropriate or necessary.

(b) The secretary may incorporate in any license, at the time of its issuance or thereafter, any requirements and conditions with respect to the licensee's receipt, possession, use, or transfer of radioactive material as the secretary deems appropriate or necessary in order to:

(1) Protect health or to minimize danger to life and property;

(2) assure the proper reporting, record-keeping and inspection of activities by the licensee; and

(3) prevent loss or theft of material subject to these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-184. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-184a. **Specific conditions on all licenses.** (a) No license nor any right under any license shall be assigned or otherwise transferred except as authorized under the act or these regulations.

(b) Each person licensed under these regulations shall confine the use and possession of the material licensed to the locations and purposes authorized in the license.

(c) No person shall introduce radioactive material into any product or material knowing or hav-

ing reason to believe that the product or material will be transferred to a person exempt from these regulations under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 28-35-192d, 28-35-192e, 28-35-192f or 28-35-192g or equivalent regulations of the United States nuclear regulatory commission or an agreement state, except in accordance with a specific license issued under K.A.R. 28-35-181f or the general license issued in K.A.R. 28-35-194a.

(d) Each licensee shall file written notice with the secretary 30 days prior to vacating any facility when the licensee decides to permanently discontinue all activities involving licensed materials authorized in that facility under the license.

(e) Each licensee authorized under K.A.R. 28-35-181h to distribute devices to generally licensed persons shall:

(1) Report to the department all sales or transfers of those devices to persons generally licensed under K.A.R 28-35-178b. The report shall identify each general licensee by name and address, the type of device transferred, and the quantity and type of radioactive material contained in the device. A report shall be submitted within 90 days of sale or transfer; and

(2) furnish, to each general licensee to whom the licensee transfers any such device, a copy of the general license issued in K.A.R. 28-35-178. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-184b. **Reporting requirements.** (a) Immediate report. Each licensee shall notify the department of the following types of events:

(1) an event that prevents immediate protective actions necessary to avoid exposures to radiation or radioactive materials that could exceed regulatory limits; or

(2) an event involving a release of licensed material that could exceed regulatory limits. The licensee shall notify the department of the event as soon as possible, but not later than four hours after the event is discovered.

(b) Twenty-four hour report. Each licensee shall notify the department within 24 hours after the discovery of any of the following events involving licensed material:

(1) An unplanned contamination event in which:

(A) access to the contaminated area, by workers or the public, must be restricted for more than 24 hours by imposing additional radiological controls or by prohibiting entry into the area;

(B) the quantity of material involved is greater than five times the lowest annual limit on intake specified for the material in appendix B of the ''Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation,'' effective April 1994; and

(C) access to the area must be restricted for a reason other than to allow isotopes with a half-life of less than 24 hours to decay prior to decontamination;

(2) an event in which equipment is disabled or fails to function as designed when:

(A) the equipment is required by regulation or license condition to prevent releases exceeding regulatory limits, to prevent exposures to radiation and radioactive materials exceeding regulatory limits, or to mitigate the consequences of an accident;

(B) the equipment is required to be available and operable at the time it is disabled or fails to function; and

(C) no redundant equipment is available and operable to perform the required safety function;

(3) an event that requires unplanned medical treatment at a medical facility of an individual with spreadable radioactive contamination on the individual or the individual's clothing; and

(4) an unplanned fire or explosion damaging any licensed material or any device, container, or equipment containing licensed material when:

(A) the quantity of material involved is greater than five times the lowest annual limit of intake specified for the material in appendix B of the ''Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation,'' effective April 1994; and

(B) the damage affects the integrity of the licensed material or its container.

(c) Preparation and submission of reports. Each report made by a licensee in response to the requirements of this regulation shall be made as follows:

(1) Each licensee shall make the reports required by subsection (a) and (b) of this regulation by telephone to the Kansas department of health and environment-bureau of air and radiation-radiation control program. The report shall include, to extent it is available, the following information:

(A) the caller's name and a call back number;

(B) a description of the event, including the date and time;

(C) the exact location of the event;

(D) the isotopes, quantities, and chemical and physical forms of the licensed material involved; and

(E) any personnel radiation exposure data available.

(2) Written report. Each licensee who makes a report required by subsections (a) and (b) of this regulation shall submit a written follow-up report within 30 days of the initial report. A written report submitted pursuant to other requirements of K.A.R. 28-35-133 through K.A.R. 28-35-363 shall be considered to fulfill this requirement if the report contains all of the information required under this paragraph. The report shall include the following:

(A) a description of the event, including the probable cause, and the name of the manufacturer and the model number, if applicable, of any equipment that failed or malfunctioned;

(B) a description of the exact location of the event;

(C) the isotopes, quantity, and chemical and physical form of the licensed material involved;

(D) the date and time of the event;

(E) a description of corrective actions taken or planned and the results of any evaluations or assessments; and

(F) a description of the extent to which individuals were exposed to radiation or to radioactive materials, without identifying individuals by name. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-185. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-185a. **Expiration of licenses.** Except as provided in K.A.R. 28-35-186a(b), each specific license shall expire at end of the day, in the month and year stated on the license. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-186. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-186a. **Renewal of licenses.** (a) Each application for the renewal of a specific license shall be filed in accordance with K.A.R 28-35-179a.

(b) When a licensee, not less than 30 days prior to the expiration of the licensee's existing license, has filed an application in proper form for renewal of the existing license, the existing license shall not expire until final action on the application has been made by the secretary. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-187. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-187a. **Amendment of licenses at request of licensee.** Each application for the amendment of an existing license shall be filed in accordance with K.A.R. 28-35-179a and shall specify the respects in which the licensee desires the license to be amended and the grounds for the amendment. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-188. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-188a. **Department action on application to renew or amend.** In considering whether to grant or deny an application to renew an existing license, the secretary shall apply the criteria which are applied to determine whether an initial license should be granted or denied. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-189. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-189a. **Advance notification of transport of nuclear waste.** (a) Prior to the transport of any nuclear waste outside the confines of the licensee's facility or any other place of use or storage, or prior to the delivery of any nuclear waste to a carrier for transport, each licensee shall provide advance notification of such transport to the governor, or the governor's designee, of each state through which the waste will be transported. For the purpose of this regulation, ''nuclear waste'' means any large quantity of source, by-product, or special nuclear material required to be in type B packaging while transported to, through, or across state boundaries to

a disposal site, or to a collection point for transport to a disposal site.

(b) Each advance notification required by this regulation shall contain the following information:

(1) the name, address, and telephone number of the shipper, carrier and receiver of the shipment;

(2) a description of the nuclear waste contained in the shipment as required by regulation of the U.S. department of transportation 49 CFR 172.202 and 172.203(d), as in effect July 1, 1984;

(3) the point of origin of the shipment and the seven day period during which departure of the shipment is estimated to occur;

(4) the seven day period during which arrival of the shipment at state boundaries is estimated to occur;

(5) the destination of the shipment, and the seven day period during which arrival of the shipment is estimated to occur; and

(6) a point of contact with a telephone number for current shipment information.

(c) The notification required by this regulation shall be made in writing to the office of each appropriate governor or the governor's designee and to the Kansas department of health and environment. A notification delivered by mail shall be postmarked at least seven days before the beginning of the seven day period during which departure of the shipment is estimated to occur. A notification delivered by messenger shall reach the office of each governor, or the governor's designee, at least four days before the beginning of the seven day period during which departure of the shipment is estimated to occur. A copy of the notification shall be retained by the licensee for one year.

(d) The licensee shall notify each appropriate governor, or the governor's designee, and the Kansas department of health and environment of any changes to the schedule information provided pursuant to this regulation. Such notification shall be by telephone to a responsible individual in the office of each appropriate governor, or to the governor's designee. The licensee shall maintain for one year a record of the name of the individual contracted.

(e) Each licensee who cancels a nuclear waste shipment for which advance notification has been sent shall send a cancellation notice to the governor, or the governor's designee, of each appropriate state and to the Kansas department of health and environment. A copy of the notice shall be retained by the licensee for one year.

(f) A list of the mailing addresses of each governor and each designee is available upon request from the director, office of state programs, U.S. nuclear regulatory commission, Washington, D.C. 20555. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-190. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-190a. **Transfer of material.** (a) A licensee shall not transfer radioactive material except as authorized in this regulation.

(b) Any licensee may transfer radioactive material, subject to the acceptance of the transferee:

(1) To the department;

(2) to the United States nuclear regulatory commission or its successor;

(3) to any person exempt from these regulations under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 28-35-192d, 28-35-192e, 28-35-192f and 28-35-192g, as permitted under those regulations;

(4) to any person authorized to receive the material under an appropriate general or specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state, or to any person otherwise authorized to receive the material by the federal government or any agency thereof, the secretary or an agreement state; or

(5) as otherwise authorized in writing by the secretary; or

(6) to the U.S. department of energy.

(c) Before transferring radioactive material to a specific licensee or to a general licensee who is required to register with the department, the United States nuclear regulatory commission, or an agreement state, the licensee transferring the material shall verify that the transferee's license authorizes receipt of the type, form, and quantity of radioactive material to be transferred.

(d) The following methods for the verification required by subsection (c) shall be acceptable.

(1) The transferor may obtain, and read, a current copy of the transferee's specific license or registration certificate.

(2) The transferor may obtain a written certification by the transferee that the transferee is authorized by license or registration certificate to re-

ceive the type, form, and quantity of radioactive material to be transferred, specifying the license or registration certificate number, issuing agency, and expiration date;

(3) For emergency shipments, the transferor may accept oral certification by the transferee that the transferee is authorized by license or registration certificate to receive the type, form, and quantity of radioactive material to be transferred. The oral certification shall include the license or registration certificate number, the issuing agency, and expiration date. The oral certification shall be confirmed in writing within 10 days following the oral certification.

(4) The transferor may obtain other sources of information compiled by a reporting service from official records of the department, United States nuclear regulatory commission, or an agreement state as to the identity of licensees and the scope and expiration dates of licenses and registration.

(5) When none of the methods of verification described in paragraphs (1) to (4) are readily available, or when a transferor desires to verify that information received by one of those methods is correct or up-to-date, the transferor may obtain and record confirmation, from the department, the United States nuclear regulatory commission or an agreement state, that the transferee is licensed to receive the radioactive material.

(e) The radioactive material shall be prepared for shipment and transport in accordance with K.A.R. 28-35-196a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-191. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-191a. **Modification, revocation, and termination of licenses.** (a) Any license may be suspended or revoked by reason of amendment to the act or these regulations or by an order of the secretary.

(b) Any license may be revoked, suspended, or modified, in whole or in part:

(1) For any material false statement in the application or any statement of fact required under provision of the act or these regulations;

(2) because of any condition, revealed by the application, or any statement of fact, or any report, record, or inspection or other means, which would warrant the denial of an original application; or

(3) for violation of, or failure to observe, any of the terms and conditions of the license, or any requirement of the act, or any rule and regulation or order of the secretary.

(c) Except in cases in which the public health, interest, or safety requires otherwise, no license shall be modified, suspended, or revoked unless, prior to the institution of such proceedings:

(1) those facts or conduct which appear to warrant such action have been called to the attention of the licensee in writing; and

(2) the licensee has been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements.

(d) The secretary may revoke a specific license upon written request of a licensee. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-192a. **Exemptions; source material.** (a) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers source material in any chemical mixture, compound, solution, or alloy in which the source material, by weight, is less than 0.05 percent of the mixture, compound, solution, or alloy.

(b) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers unrefined and unprocessed ore containing source material and does not refine or process the ore.

(c) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers:

(1) Any quantities of thorium contained in:

(A) Incandescent gas mantles;

(B) vacuum tubes;

(C) welding rods;

(D) electric lamps for illuminating purposes, if each lamp does not contain more than 50 milligrams of thorium;

(E) germicidal lamps, sunlamps, and lamps for outdoor or industrial lighting, if each lamp does not contain more than two grams of thorium;

(F) rare earth metals and compounds, mixtures, and products containing not more than

0.25 percent thorium or uranium, or both, by weight; or

(G) personnel neutron dosimeters, if each dosimeter does not contain more than 50 milligrams of thorium;

(2) Source material contained in:

(A) Glazed ceramic tableware, if the glaze contains not more than 20 percent source material, by weight;

(B) glassware, containing not more than 10 percent source material by weight. This exemption shall not include commercially manufactured glass brick, pane glass, ceramic tile or other glass, or ceramic used in construction; and

(C) glass enamel or glass enamel frit that contains not more than 10 percent source material, by weight, and that was imported or ordered for importation into the United States, or initially distributed by manufacturers in the United States, before July 25, 1983; or

(D) piezoelectric ceramic containing not more than two percent source material by weight;

(3) photograhic film, negatives, and prints containing uranium or thorium;

(4) any finished product or part of a product fabricated of, or containing, tungsten or magnesium-thorium alloys if the thorium content of the alloy does not exceed four percent, by weight. The exemption contained in this paragraph shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any product or part of a product;

(5) uranium contained in counterweights installed in aircraft, rockets, projectiles or missiles or stored or handled in connection with installation or removal of these counterweights when:

(A) the counterweights are manufactured in accordance with the specifications contained in a specific license issued by the secretary, the United States nuclear regulatory commission or an agreement state, and when distribution by the licensee is authorized pursuant to this paragraph or an equivalent provision of the regulations of the United States nuclear regulatory commission or an agreement state;

(B) each counterweight has been impressed in a manner that is clearly legible through any plating or covering with the following legend: ''DEPLETED URANIUM''; and

(C) each counterweight is durably and legibly labeled or marked with the identification of the manufacturer, and the statement: ''UNAUTHORIZED ALTERATIONS PROHIBITED''. The exemption contained in this paragraph shall not be deemed to authorize the chemical, physical, or metallurgical treatment or processing of any counterweights, other than repair or restoration of any plating or other covering;

(6) uranium used as shielding and constituting part of any shipping container. The uranium shielding shall be conspicuously and legible impressed with the legend ''CAUTION—RADIOACTIVE SHIELDING—URANIUM'' and shall be enclosed in mild steel, or another equally fire resistant metal, with a minimum wall thickness of one-eighth inch (3.2 mm);

(7) thorium contained in finished optical lenses, if each lens does not contain more than 30 percent of thorium by weight. The exemption contained in this paragraph shall not be deemed to authorize either:

(A) The shaping, grinding, or polishing of the lens or any manufacturing processes other than the assembly of the lens into optical systems and devices without any alteration of the lens; or

(B) the receipt, possession, use or transfer of thorium contained in contact lenses, or in spectacles, or in eyepieces in binoculars or other optical instruments;

(8) uranium contained in detector heads for use in fire detection units, if each detector head contains not more than 0.005 microcurie of uranium; and

(9) thorium contained in any finished aircraft engine part containing nickel-thoria alloy, if:

(A) The thorium is dispersed in the nickel-thoria alloy in the form of finely divided thoria (thorium dioxide); and

(B) the thorium content in the nickel-thoria alloy does not exceed four percent by weight.

(d) The exemptions provided in this regulation shall not authorize the manufacture, processing or production of any of the products described in this regulation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192b. **Exemptions; exempt concentrations of radioactive materials.** (a) Except as provided in K.A.R. 28-35-184a(e), any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfer products or materials containing radioactive material in concentrations not exceeding those specified in K.A.R. 28-35-198a.

(b) Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers products containing naturally occurring radionuclides of elements with an atomic number less than 82, in isotopic concentrations not in excess of those which occur naturally.

(c) No person shall introduce radioactive material into a product or material knowing, or having reason to believe, that it will be transferred to a person exempt from these regulations under subsection (a) or under an equivalent regulation of the U.S. nuclear regulatory commission or an agreement state, except in accordance with a specific license issued under K.A.R. 28-35-181e or the general license issued in K.A.R. 28-35-194a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192c. **Exceptions; other radioactive material.** Except for persons who apply tritium, promethium-147 or radium to, or persons who incorporate tritium, promethium-147 or radium into, the products listed in this regulation, any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers the products listed in this subsection:

(a) Timepieces or hands or dials containing radium, or timepieces, hands or dials containing not more than the following specified quantities of other radioactive materials:

(1) 25 millicuries of tritium per time piece;

(2) 5 millicuries of tritium per hand;

(3) 15 millicuries of tritium per dial. Bezels, when used, shall be considered as part of the dial;

(4) 100 microcuries of promethium-147 per watch or 200 microcuries of promethium-147 per any other timepiece;

(5) 20 microcuries of promethium-147 per watch hand or 40 microcuries of promethium-147 per hand on other timepieces; and

(6) 60 microcuries of promethium-147 per watch dial or 120 microcuries of promethium-147 per dial on other time pieces. Bezels, when used, shall be considered as part of the dial. The levels of radiation from hands and dials containing promethium-147 shall not exceed, when measured through 50 milligrams per square centimeter of absorber:

(A) For wrist watches, 0.1 millirad per hour at 10 centimeters from any surface;

(B) for pockect watches, 0.1 millirad per hour at one centimeter from any surface; and

(C) for any other timepiece, 0.2 millirad per hour at 10 centimeters from any surface;

(b) lock illuminators containing not more than 15 millicures of tritium or not more than two millicuries of promethium-147 installed in automobile locks. The level of radiation from each lock illuminator containing promethium-147 shall not exceed one millirad per hour at one centimeter from any surface when measured through 50 milligrams per square centimeter of absorber;

(c) balances of precision containing not more than one millicurie of tritium per balance or not more than 0.5 millicurie of tritium per balance part;

(d) automobile shift quadrants containing not more than 25 millicuries of tritium.

(e) marine compasses containing not more than 750 millicuries of tritium gas and other marine navigational instruments containing not more than 250 millicuries of tritium gas;

(f) thermostat dials and pointers containing not more than 25 millicuries of tritium per thermostat;

(g) electron tubes, if each tube does not contain more than one of the following specified quantities of radioactive material:

(1) 150 millicuries of tritium per microwave receiver protector tube or 10 millicuries of tritium per any other electron tube;

(2) 1 microcurie cobalt-60;

(3) 5 microcurie nickel-63;

(4) 30 microcurie krypton-85;

(5) 5 microcurie cesium-137; or

(6) 30 microcuries promethium-147. The levels of radiation from each electron tube containing radioactive material shall not exceed one millirad per hour at one centimeter from any surface when measured through seven milligrams per square centimeter of absorber. For purposes of this paragraph, ''electron tubes'' include spark gap tubes, power tubes, gas tubes, gas tubes including glow lamps, receiving tubes, microwave tubes, indicator tubes, pickup tubes, radiation detection tubes and any other completely sealed tube that is designed to conduct or control electrical currents.

(h) ionizing radiation measuring instruments containing, for purposes of internal calibration or standardization, sources of radioactive material. No source shall exceed the applicable quantity set forth in K.A.R. 28-35-197a. No single instrument shall contain more than 10 sources. For the pur-

poses of this paragraph, 0.05 uCi of Am-241 shall be considered an exempt quantity; and

(i) spark gap irradiators containing not more than 1 microcurie of cobalt-60 per spark gap irradiator for use in electrically ignited fuel oil burners having a firing rate of at least three gallon (11.4 liters) per hour. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192d. **Exceptions; resins containing scandium-46 and designed for sand consolidation in oil wells.** Any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers synthetic plastic resins containing scandium-46 which are designed for sand consolidation in oil wells. These resins shall have been manufactured or imported in accordance with a specific license issued by the secretary, the United States nuclear regulatory commission, or an agreement state. This exemption shall not authorize the manufacture of any resins containing scandium-46. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192e. **Exemptions; gas and aerosol detectors containing radioactive material.** (a) Except for persons who manufacture, process, or produce gas and aerosol detectors containing radioactive material or who import these products, any person shall be exempt from these regulations to the extent the person acquires, possesses, uses or transfers radioactive material in gas and aerosol detectors designed to protect life or property from fires and airborne hazards. Each detector shall have been manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the secretary pursuant to K.A.R. 28-35-181q or a license issued by the United States nuclear regulatory commission, or an agreement state pursuant to an equivalent regulation of the U.S. nuclear regulatory commission or an agreement state.

(b) Gas and aerosol detectors previously manufactured and distributed to general licensees in accordance with a specific license issued by an agreement state shall be exempt under subsection (a) if the device is labeled in accordance with the specific license authorizing distribution of the general licensed device, and if the detectors meet the requirements of K.A.R. 28-35-181(r). (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192f. **Exemptions; self-luminous products containing tritium, krypton-85 or promethium-147.** (a) Except for persons who manufacture, process, or produce self-luminous products containing tritium, krypton-85, or promethium-147 and except as provided in subsection, (b) any person shall be exempt from these regulations to the extent that person acquires, possesses, uses, or transfers, tritium, krypton-85, or promethium-147 in self-luminous products manufactured, processed, produced, imported, or transferred in accordance with a specific license issued by the United States nuclear regulatory commission pursuant to Section 32.22 of Title 10 CFR 31, which authorizes the transfer of the product to persons who are exempt from regulatory requirements.

(b) The exemption in subsection (a) shall not apply to tritium, krypton-85, or promethium-147 used in toys, adornments, or similar items. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-192g. **Exemptions; exempt quantities.** (a) Except as provided in subsections (c) and (d), any person shall be exempt from these regulations to the extent the person acquires, possesses, uses, or transfers radioactive material in individual quantities which do not exceed the applicable quantity specified in K.A.R. 28-35-197a.

(b) Any person who possesses radioactive material received or acquired prior to January 1, 1972 under the general license then provided in K.A.R. 28-35-178(A) shall be exempt from these regulations to the extent the person possesses, uses, or transfers that radioactive material. This exemption does not apply to radium-226.

(c) This regulation shall not authorize the production, packaging or repackaging of radioactive material for purposes of commercial distribution, or the incorporation of radioactive material into products intended for commercial distribution.

(d) No person shall, for purposes of commercial distribution, transfer radioactive material in the individual quantities specified in K.A.R. 28-35-197a knowing, or having reason to believe, that those quantities of radioactive material will be transferred to a person exempt from these regulations under this regulation or an equivalent regulation of the U.S. nuclear regulatory commission,

or an agreement state, except in accordance with a specific license issued by the secretary under K.A.R. 28-35-181r, an equivalent regulation of the United States nuclear regulatory commission, or an agreement state. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-193. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-193a. **Pre-licensing inspections.** The department may request verification of information provided in any application or request additional information that is necessary to make a determination as to whether a license should be granted or denied and whether any special conditions should be attached to the license. This information may be obtained by visiting the facility or location where radioactive materials would be possessed or used, and by discussing details of proposed possession or use of the radioactive material with the applicant or the applicant's designated representatives. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-193b. **Emergency plan criteria.** (a) Each application to possess radioactive materials in amounts in excess of the quantities in K.A.R. 28-35-202, "Schedule H - Quantities of Radioactive Materials Requiring Consideration of the Need for an Emergency Plan for Responding to a Release," whether in unsealed form, on foils or plated sources, or sealed in glass, shall contain either:

(1) An evaluation showing that the maximum dose to a person offsite due to a release of radioactive materials would not exceed one rem effective dose equivalent or five rems to the thyroid; or

(2) an emergency plan for responding to a release of radioactive material.

(b) The applicant may use one or more of the following factors to support the evaluation submitted under K.A.R. 28-35-193b (a)(1):

(1) Portions of the radioactive material are physically separated from the rest of the material so that only a portion could be involved in an accident;

(2) all or part of the radioactive material would not be subject to release during an accident because of the way it is stored or packaged;

(3) the release fraction in the respirable size range would be lower than the release fraction shown in K.A.R. 28-35-202, due to the chemical or physical form of the material;

(4) the solubility of the radioactive material would reduce the dose received;

(5) facility design or engineered safety features in the facility would cause the release fraction to be lower than the limits shown in K.A.R. 28-35-202;

(6) operating restrictions or procedures would prevent a release fraction as large as the limits shown in K.A.R. 28-35-202; or

(7) other factors appropriate for the specific facility.

(c) Each emergency plan for responding to a release of radioactive material submitted under K.A.R. 28-35-193b (a)(2) shall include the following information.

(1) Facility description. Each plan shall contain a brief description of the licensee's facility and the area near the site.

(2) Types of accidents. Each type of radioactive materials accident for which protective actions may be needed shall be identified in the plan.

(3) Classification of accidents. Each plan shall include a classification system for classifying accidents as alerts or site-area emergencies.

(4) Detection of accidents. The plan shall identify the means which will be used to detect each type of accident in a timely manner.

(5) Mitigation of consequences. Each plan shall contain a brief description of the means and equipment for mitigating the consequences of each type of accident, including those provided to protect workers on-site, and a description of the program for maintaining the equipment.

(6) Assessment of releases. The plan shall include a brief description of the methods and equipment which will be used to assess releases of radioactive materials.

(7) Responsibilities. Each plan shall contain a brief description of the responsibilities of the licensee's personnel if an accident occurs, including:

(A) a list of personnel responsible for promptly notifying offsite response organizations and the department; and

(B) a list of personnel who are responsible for developing, maintaining, and updating the plan.

(8) Notification and coordination. Each plan shall contain a commitment to and a brief description of the means to promptly notify offsite re-

sponse organizations of any accident and request offsite assistance, including medical assistance for the treatment of contaminated and injured onsite workers when appropriate. The licensee shall establish a control point. Each licensee's planned notifications and coordinations shall be prepared so that the unavailability of some personnel, parts of the facility, or equipment will not prevent the notification and coordination. The licensee shall also make a written commitment to notify the department immediately after notification of the appropriate offsite response organizations and not later than one hour after the licensee declares an emergency. These reporting requirements shall not supersede or release any licensee from the duty of complying with the requirements under the emergency planning and community right-to-know act of 1988 title III, Pub.L. 99-499, or other state or federal reporting requirements.

(9) Information to be communicated. Each plan shall contain a brief description of the types of information regarding the facility's status, radioactive releases, and recommended protective actions, if necessary, which will be given to each offsite response organization and to the department.

(10) Training. The plan shall include a brief description of the plans for training that the licensee will provide to workers regarding responses to an emergency including the following:

(A) the proposed frequency of training sessions;

(B) the performance objectives and plans for the training; and

(C) any special instructions and orientation tours the licensee would offer to fire, police, medical and other emergency personnel. The training shall familiarize personnel with site-specific emergency procedures. The training also shall thoroughly prepare site personnel for their responsibilities in the event of the accident scenarios postulated as most probable for the specific site, including the use of team training for such scenarios.

(11) Safe shutdown. A brief description of the means of restoring the facility to a safe condition after an accident shall be included in the plan.

(12) Exercises. The plan shall include provisions for conducting quarterly communications checks with offsite response organizations and biennial on-site exercises to test response to simulated emergencies.

(A) During each quarterly communication check with off-site response organizations, the licensee shall check and update all necessary telephone numbers.

(B) Each licensee shall invite off-site response organizations to participate in the biennial exercises. Participation of offsite response organizations in biennial exercises is recommended but not required. During the exercises each licensee shall use accident scenarios postulated as the most probable for that specific site and the scenarios shall not be known to most exercise participants.

(C) The licensee shall critique each exercise using individuals not having direct implementation responsibility for the plan. Critiques of exercises shall evaluate the appropriateness of the plan, emergency procedures, facilities, equipment, training of personnel, and overall effectiveness of the response. Each licensee shall correct each deficiency found by the critiques.

(13) Hazardous chemicals. Each plan shall contain a certification that the applicant has met its responsibilities under the emergency planning and community right-to-know act of 1986, title III, Pub. L. 99-499, if applicable to the applicant's activities at the proposed place of use of the radioactive material.

(d) Each licensee shall allow the off-site response organizations expected to respond in case of an accident 60 days to comment on the licensee's emergency plan before submitting it to the department. The licensee shall provide all comments received within the 60-day period to the department with the emergency plan. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-194. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-194a. **Reciprocal recognition of licenses.** (a)(1) Subject to other provisions in this regulation, any person who possesses a specific license issued by the United States nuclear regulatory commission or an agreement state, other than this state, is issued a general license to conduct the activities authorized in the specific license within this state without obtaining a specific license from the secretary, if:

(A) The specific license does not limit the activity authorized to a specified installation or location; and

(B) the person notifies the department in writing at least five days prior to engaging in the activity.

The notification shall indicate the location, period, and type of proposed possession and use within the state, and shall be accompanied by a copy of the specific license. If, for a specific case, the five day period would impose an undue hardship, the person may, upon application to the department, obtain permission by letter or telegram to proceed;

(C) the person complies with all applicable regulations of the secretary and with all the terms and conditions of the specific license, except any term or condition of the license which is inconsistent with these regulations;

(D) the person supplies any information requested by the department; and

(E) the person does not transfer or dispose of radioactive material possessed or used under the general license provided in this regulation except by transfer to a person;

(i) specifically licensed by the department or the United States nuclear regulatory commission to receive the material; or

(ii) who is exempt from the requirements for a license for that material under K.A.R. 28-35-192a, 28-35-192b, 28-35-192c, 28-35-192d, 28-35-192e, 28-35-192f or 28-35-192g.

(b) Any person who holds a specific license issued by the U.S. nuclear regulatory commission, or an agreement state which authorizes the person to manufacture, transfer, install, or service a device described in K.A.R. 28-35-178b within areas subject to the jurisdiction of the licensing body is issued a general license to manufacture, install, transfer, or service those devices in this state subject to the following conditions.

(1) The person shall satisfy the requirements of K.A.R. 28-35-184a(e)(1) and (2).

(2) The device shall be manufactured, labeled, installed, and serviced in accordance with the provisions of the specific license issued to the person by the United States nuclear regulatory commission or the agreement state.

(3) The person shall assure that any labels required to be affixed to the device, under regulations of the authority which licensed the manufacture of the device, and which bear the statement "Removal of this label is prohibited", are affixed to the device.

(4) The person shall furnish to each general licensee to whom the person transfers the device, or on whose premises the person installs the device, a copy of the general license issued in K.A.R. 28-35-178b.

(c) The secretary may withdraw, limit, or qualify acceptance of any specific license recognized under this regulation, or any product distributed pursuant to such a license, upon determining that the action is necessary in order to protect health or minimize danger to life or property. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-195. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-195a. **Intrastate transportation of radioactive materials.** (a) A general license is issued to any common or contract carrier to transport and store radioactive material in the regular course of its carriage for another, if the transportation and storage is performed in accordance with the regulations of the U.S. department of transportation. Persons who transport and store radioactive material pursuant to the general license issued in this subsection shall be exempt from the requirements of parts 4 and 10 of these regulations.

(b) A general license is hereby issued to any private carrier to transport radioactive material, if the transportation is performed in accordance with the regulations of the U.S. department of transportation. Any person who transports radioactive material under the general license issued in this subsection shall be exempt from the requirements of parts 4 and 10 of these regulations.

(c) Physicians, as defined in K.A.R. 28-35-135a, shall be exempt from the requirements of subsection (b) of this regulation to the extent that they transport radioactive material for use in the practice of medicine. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-196. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-196a. **Preparation of radioactive material for transport.** (a) A licensee shall not deliver any radioactive material to a carrier for transport, or transport radioactive material as a private carrier, unless:

(1) The licensee complies with the applicable requirements of the regulations of the U.S. department of transportation that are appropriate to

the mode of transport and that are related to the packing of radioactive material, and to the monitoring, marking, and labeling of those packages;

(2) the licensee has established procedures for opening and closing packages in which radioactive material is transported to provide safety and to assure that, prior to the delivery to a carrier for transport, each package is properly closed for transport; and

(3) prior to delivery of a package to a carrier for transport, the licensee has assured that any special instructions needed to safely open the package are sent to, or are available to, the consignee.

(b) The requirements in subsection (a) of this regulation shall not apply to the transportation of licensed material, or to the delivery of licensed material to a carrier for transport, when the transportation is subject to regulations of the U.S. postal service. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-196b. **Transportation of radioactive material.** (a) No person shall deliver radioactive material to a carrier for transport or transport radioactive material except as authorized in a general or specific license issued by the department unless:

(1) That person's activities are exempted from licensure by Section 28-35-140(b) of these regulations;

(2) each of the packages delivered to a carrier for transport or transported contains radioactive materials bearing a specific activity of less than, or equal to, 0.002 microcurie (74 Bq) per gram; or

(3) the packages delivered to a carrier for transport are subject to the regulations of the U.S. Postal Service. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-197. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-197a. **Schedule B; Exempt quantities of radioactive material.**

Radioactive Material	Microcuries	Radioactive Material	Microcuries
Antimony 122 (Sb 122)	100	Osmium 191 (Os 191)	100
Antimony 124 (Sb 124)	10	Osmium 193 (Os 193)	100
Antimony 125 (Sb 125)	10	Palladium 103 (Pd 103)	100
Arsenic 73 (As 73)	100	Palladium 109 (Pd 109)	100
Arsenic 74 (As 74)	10	Phosphorous 32 (P 32)	10
Arsenic 76 (As 76)	10	Platinum 191 (Pt 191)	100
Arsenic 77 (As 77)	100	Platinum 193m (Pt 193m)	100
Barium 131 (Ba 131)	10	Platinum 193 (Pt 193)	100
Barium 133 (Ba 133)	10	Platinum 197m (Pt 197m)	100
Barium 140 (Ba 140)	10	Platinum 197 (Pt 197)	100
Bismuth 210 (Bi 210)	1	Polonium 210 (Po 210)	0.1
Bromine 82 (Br 82)	10	Potassium 42 (K 42)	10
Cadmium 109 (Cd 109)	10	Potassium 43 (K 43)	10
Cadmium 115m (Cd 115m)	10	Praseodymium 142 (Pr 142)	100
Cadmium 115 (Cd 115)	100	Praseodymium 143 (Pr 143)	100
Calcium 45 (Ca 45)	10	Promethium 147 (Pm 147)	10
Calcium 47 (Ca 47)	10	Promethium 149 (Pr 149)	10
Carbon 14 (C 14)	100	Rhenium 186 (Re 186)	100
Cerium (Ce 141)	100	Rhenium 188 (Re 188)	100
Cerium 143 (Ce 143)	100	Rhodium 103m (Rh 103m)	100
Cerium 144 (Ce 144)	1	Rhodium 105 (Rh 105)	100
Cesium 129 (Cs 129)	100	Rubidium 81 (Rb 81)	10
Cesium 131 (Cs 131)	1,000	Rubidium 86 (Rb 86)	10
Cesium 134m (Cs 134m)	100	Rubidium 87 (Rb 87)	10
Cesium 134 (Cs 134)	1	Ruthenium 97 (Ru 97)	100
Cesium 135 (Cs 135)	10	Ruthenium 103 (Ru 103)	10
Cesium 136 (Cs 136)	10	Ruthenium 105 (Ru 105)	10
Cesium 137 (Cs 137)	10	Ruthenium 106 (Ru 106)	1
Chlorine 36 (Cl 36)	10	Samarium 151 (Sm 151)	10
Chlorine 38 (Cl 38)	10	Samarium 153 (Sm 153)	100
Chromium 51 (Cr 51)	1,000	Scandium 46 (Sc 46)	10
Cobalt (Co 57)	100	Scandium 47 (Sc 47)	100
Cobalt 58m (Co 58m)	10	Scandium 48 (Sc 48)	10
Cobalt 58 (Co 58)	10	Selenium 75 (Se 75)	75
Cobalt 60 (Co 60)	1	Silicon 31 (Si 31)	100
Copper 64 (Cu 64)	100	Silver 105 (Ag 105)	10
Dysprosium 165 (Dy 165)	10	Silver 110m (Ag 110m)	1
Dysprosium 166 (Dy 166)	100	Silver 111 (Ag 111)	100
Erbium 169 (Er 169)	100	Sodium 22 (Na 22)	10
Erbium 171 (Er 171)	100	Sodium 24 (Na 24)	10
Europium 152 9.2 h (Eu 152 9.2 h)	100	Strontium 85 (Sr 85)	10
Europium 152 13 yr (Eu 152 13 yr)	1	Strontium 89 (Sr 89)	1
Europium 154 (Eu 154)	1	Strontium 90 (Sr 90)	0.1
Europium 155 (Eu 155)	10	Strontium 91 (Sr 91)	10
Fluroine 18 (F 18)	1,000	Strontium 92 (Sr 92)	10
Gadolinium 153 (Gd 153)	10	Sulphur 35 (S 35)	100
Gadolinium 159 (Gd 159)	100	Tantalum 182 (Ta 182)	10
Gallium 67 (Ga 67)	100	Technetium 96 (Tc 96)	10
Gallium 72 (Ga 72)	10	Technetium 97m (Tc 97m)	100
Germanium 71 (Ge 71)	100	Technetium 97 (Tc 97)	100
Gold 198 (Au 198)	100	Technetium 99m (Tc 99m)	100
Gold 199 (Au 199)	100	Technetium 99 (Tc 99)	10
Hafmium 181 (Hf 181)	10	Tellurium 125m (Te 125m)	10
Holmium 166 (Ho 166)	100	Tellurium 127m (Te 127m)	10
Hydrogen 3 (H 3)	1,000	Tellurium 127 (Te 127)	100
Indium 111 (In 111)	100	Tellurium 129m (Te 129m)	10
Indium 113m (In 113m)	100	Tellurium 129 (Te 129)	100
Indium 114m (In 114m)	100	Tellurium 131m (Te 131m)	10
Indium 115m (In 115m)	100	Tellurium 132 (Te 132)	10
Indium 115 (In 115)	10	Terbium 160 (Tb 160)	10
Iodine 123 (I 123)	100		
Iodine 125 (I 125)	1		
Iodine 126 (I 126)	1		
Iodine 129 (I 129)	0.1		
Iodine 131 (I 131)	1		
Iodine 132 (I 132)	10		
Iodine 133 (I 133)	1		
Iodine 134 (I 134)	10		
Iodine 135 (I 135)	10		
Iridium 192 (Ir 192)	10		

Radioactive Material	Micro-curies	Radioactive Material	Micro-curies
Iridium 194 (Ir 194)	100	Thallium 200 (Tl 200)	100
Iron 52 (Fe 52)	10	Thallium 201 (Tl 201)	100
Iron 55 (Fe 55)	100	Thallium 202 (Tl 202)	100
Iron 59 (Fe 59)	10	Thallium 204 (Tl 204)	10
Krypton 85 (Kr 85)	100	Thulium 170 (Tm 170)	10
Krypton 87 (Kr 87)	10	Thulium 171 (Tm 171)	10
Lanthanum 140 (La 140)	10	Tin 113 (Sn 113)	10
Lutetium 177 (Lu 177)	100	Tin 125 (Sn 125)	10
Manganese 52 (Mn 52)	10	Tungsten 181 (W 181)	10
Manganese 54 (Mn 54)	10	Tungsten 185 (W 185)	10
Manganese 56 (Mn 56)	10	Tungsten 187 (W 187)	100
Mercury 197m (Hg 197m)	100	Vanadium 48 (V 48)	10
Mercury 197 (Hg 197)	100	Xenon 131m (Xe 131m)	1,000
Mercury 203 (Hg 203)	10	Xenon 133 (Xe 133)	100
Molybdenum 99 (Mo 99)	100	Yttrium 175 (Yb 175)	100
Neodymium 147 (Nd 147)	100	Yttrium 87 (Y 87)	10
Neodymium 149 (Nd 149)	100	Yttrium 90 (Y 90)	10
Nickel 59 (Ni 59)	100	Yttrium 91 (Y 91)	10
Nickel 63 (Ni 63)	10	Yttrium 92 (Y 92)	100
Nickel 65 (Ni 65)	100	Yttrium 93 (Y 93)	100
Niobium 93m (Nb 93m)	10	Zinc 65 (Zn 65)	10
Niobium 95 (Nb 95)	10	Zinc 69m (Zn 69m)	100
Niobium 97 (Nb 97)	10	Zinc 69 (Zn 69)	1,000
Osmium 185 (Os 185)	10	Zirconium 93 (Zr 93)	10
Osmium 191m (Os 191m)	100	Zirconium 95 (Zr 95)	10
		Zirconium 97 (Zr 97)	10
		Any radioactive material not listed above other than alphaemitting radioactive material.....	0.1

(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-198. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-198a. **Schedule C; Exempt concentrations.**

Element (atomic number)	Isotope	Column I Gas Concentration uCi/ml[1]	Column II Liquid and solid concentration uCi/ml[2]
Antimony (51)	Sb 122		$32\ 10^{24}$
	Sb 124		$22\ 10^{24}$
	Sb 125		$12\ 10^{23}$
Argon (18)	Ar 37	$12\ 10^{23}$	
	Ar 41	$42\ 10^{27}$	
Arsenic (33)	As 73		$52\ 10^{23}$
	As 74		$52\ 10^{24}$
	As 76		$22\ 10^{24}$
	As 77		$82\ 10^{24}$
Barium (56)	Ba 131		$22\ 10^{23}$
	Ba 140		$32\ 10^{24}$
Beryllium (4)	Be 7		$22\ 10^{22}$
Bismuth (83)	Bi 206		$42\ 10^{24}$
Bromine (35)	Br 82	$42\ 10^{27}$	$32\ 10^{23}$
Cadmium (48)	Cd 109		$22\ 10^{23}$
	Cd 115m		$32\ 10^{24}$
	Cd 115		$32\ 10^{24}$
Calcium (20)	Ca 45		$92\ 10^{25}$
	Ca 47		$52\ 10^{24}$
Carbon (6)	C 14	$12\ 10^{26}$	$82\ 10^{23}$
Cerium (58)	Ce 141		$92\ 10^{24}$
	Ce 143		$42\ 10^{24}$
	Ce 144		$12\ 10^{24}$
Cesium (55)	Cs 131		$22\ 10^{22}$
	Cs 134m		$62\ 10^{22}$
	Cs 134		$92\ 10^{25}$
Chlorine (17)	Cl 38	$92\ 10^{27}$	$42\ 10^{23}$
Chromium (24)	Cr 51		$22\ 10^{22}$
Cobalt (27)	Co 57		$52\ 10^{23}$
	Co 58		$12\ 10^{23}$
	Co 60		$52\ 10^{24}$
Copper (29)	Cu 64		$32\ 10^{23}$
Dysprosium (66)	Dy 165		$42\ 10^{23}$
	Dy 166		$42\ 10^{24}$
Erbium (68)	Er 169		$92\ 10^{24}$
	Er 171		$12\ 10^{23}$
Europium (63)	Eu 152 (T/25 9.2 Hrs)		$62\ 10^{24}$
	Eu 155		$22\ 10^{23}$
Fluorine (9)	F 18	$22\ 10^{26}$	$82\ 10^{23}$
Gadolinium (64)	Gd 153		$22\ 10^{23}$
	Gd 159		$82\ 10^{24}$
Gallium (31)	Ga 72	$42\ 10^{24}$	
Germanium (32)	Ge 71	$22\ 10^{22}$	
Gold (79)	Au 196	$22\ 10^{23}$	
	Au 198	$52\ 10^{24}$	
	Au 199	$22\ 10^{23}$	
Hafnium (72)	Hf 181		$72\ 10^{24}$
Hydrogen (1)	H 3	$52\ 10^{26}$	$32\ 10^{22}$
Indium (49)	In 113m		$12\ 10^{22}$
	In 114m		$22\ 10^{24}$
Iodine (53)	I 126	$32\ 10^{29}$	$22\ 10^{25}$
	I 131	$32\ 10^{29}$	$22\ 10^{25}$
	I 132	$82\ 10^{28}$	$62\ 10^{24}$
	I 133	$12\ 10^{28}$	$72\ 10^{25}$
	I 134	$22\ 10^{27}$	$12\ 10^{23}$
Iridium (77)	Ir 190		$22\ 10^{23}$
	Ir 192	$42\ 10^{24}$	
	Ir 194	$32\ 10^{24}$	
Iron (26)	Fe 55	$82\ 10^{23}$	
	Fe 59		$62\ 10^{24}$
Krypton (36)	Kr 85m	$12\ 10^{26}$	
	Kr 85	$32\ 10^{26}$	
Lanthanum (57)	La 140		$22\ 10^{24}$
Lead (82)	Pb 203	$42\ 10^{23}$	
Lutetium (71)	Lu 177	$12\ 10^{23}$	
Manganese (25)	Mn 52	$32\ 10^{24}$	
	Mn 54	$12\ 10^{23}$	
	Mn 56	$12\ 10^{23}$	
Mercury (80)	Hg 197m	$22\ 10^{23}$	
	Hg 197	$32\ 10^{23}$	
	Hg 203	$22\ 10^{24}$	
Molybdenum (42)	Mo 99	$22\ 10^{23}$	
Neodymium (60)	Nd 147	$62\ 10^{24}$	
	Nd 149	$22\ 10^{23}$	
Nickel (28)	Ni 65	$12\ 10^{23}$	
Niobium (Columbium) (41)	Nb 95	$12\ 10^{23}$	
	Nb 97	$92\ 10^{23}$	
Osmium (76)	Os 185	$72\ 10^{24}$	
	Os 191m	$32\ 10^{22}$	
	Os 191	$22\ 10^{23}$	
	Os 193	$62\ 10^{24}$	
Palladium (46)	Pd 103	$32\ 10^{23}$	
	Pd 109	$92\ 10^{24}$	
Phosphorus (15)	P 32		$22\ 10^{24}$
Platinum (78)	Pt 191	$12\ 10^{23}$	

Element (atomic number)	Isotope	Column I Gas Concentration uCi/ml[1]	Column II Liquid and solid concentration uCi/ml[2]
	Pt 193m	$12\ 10^{22}$	
	Pt 197m	$12\ 10^{22}$	
	Pt 197	$12\ 10^{23}$	
Polonium (84)	Po 210		$72\ 10^{26}$
Potassium (19)	K 42		$32\ 10^{23}$
Praseodymium (59)	Pr 142		$32\ 10^{24}$
	Pr 143		$52\ 10^{24}$
Promethium (61)	Pm 147		$22\ 10^{23}$
	Pm 149		$42\ 10^{24}$
Radium (88)	Ra 226		$12\ 10^{27}$
	Ra 228		$32\ 10^{27}$
Rhenium (75)	Re 183		$62\ 10^{23}$
	Re 186		$92\ 10^{24}$
	Re 188		$62\ 10^{24}$
Rhodium (45)	Rh 103m		$12\ 10^{21}$
	Rh 105		$12\ 10^{23}$
Rubidium (37)	Rb 86		$72\ 10^{24}$
Ruthenium (44)	Ru 97		$42\ 10^{23}$
	Ru 103		$82\ 10^{24}$
	Ru 105		$12\ 10^{23}$
	Ru 106		$12\ 10^{24}$
Samarium (62)	Sm 153		$82\ 10^{24}$
Scandium (21)	Sc 46		$42\ 10^{24}$
	Sc 47		$92\ 10^{24}$
	Sc 48		$32\ 10^{24}$
Selenium (34)	Se 75		$32\ 10^{23}$
Silicon (14)	Si 31		$92\ 10^{23}$
Silver (47)	Ag 105		$12\ 10^{23}$
	Ag 110m		$32\ 10^{24}$
	Ag 111		$42\ 10^{24}$
Sodium (11)	Na 24		$22\ 10^{23}$
Strontium (38)	Sr 89		$12\ 10^{24}$
	Sr 85		$12\ 10^{23}$
	Sr 91		$72\ 10^{24}$
	Sr 92		$72\ 10^{24}$
Sulfur (16)	S 35	$92\ 10^{28}$	$62\ 10^{24}$
Tantalum (73)	Ta 182		$42\ 10^{24}$
Technetium (43)	Tc 96m		$12\ 10^{21}$
	Tc 96		$12\ 10^{23}$
Tellurium (52)	Te 125m		$22\ 10^{23}$
	Te 127m		$62\ 10^{24}$
	Te 127		$32\ 10^{23}$
	Te 129m		$32\ 10^{24}$
	Te 131m		$62\ 10^{24}$
	Te 132		$32\ 10^{24}$
Terbium (65)	Tb 160		$42\ 10^{24}$
Thallium (81)	Tl 200		$42\ 10^{23}$
	Tl 201		$32\ 10^{23}$
	Tl 202		$12\ 10^{23}$
	Tl 204		$12\ 10^{23}$
Thulium (69)	Tm 170		$52\ 10^{24}$
	Tm 171		$52\ 10^{23}$
Tin (50)	Sn 113		$92\ 10^{24}$
	Sn 125		$22\ 10^{24}$
Tungsten (Wolf ram 74)	W 181		$42\ 10^{23}$
	W 187		$72\ 10^{24}$
Vanadium (23)	V 48		$32\ 10^{24}$
Xenon (54)	Xe 131m	$42\ 10^{26}$	
	Xe 133	$32\ 10^{26}$	
	Xe 135	$12\ 10^{26}$	
Ytterbium (70)	Yb 175	$12\ 10^{23}$	
Yttrium (39)	Y 90		$22\ 10^{24}$
	Y 91m		$32\ 10^{22}$
	Y 91		$32\ 10^{24}$
	Y 92		$62\ 10^{24}$
	Y 93		$32\ 10^{24}$
Zinc (30)	Zn 65		$12\ 10^{23}$
	Zn 69m		$72\ 10^{24}$
	Zn 69		$22\ 10^{22}$
Zirconium (40)	Zr 95		$62\ 10^{24}$
	Zr 97		$22\ 10^{24}$
Beta or gamma or both emitting radioactive material not listed above with half-life less than 3 years.		$12\ 10^{210}$	$12\ 10^{26}$

NOTE 1: Many radioisotopes disintegrate into isotopes which are also radioactive. In expressing the concentrations in 28-35-198a, Schedule C, the activity state is that of the parent isotope and takes into account the daughters.

NOTE 2: For purposes of 28-35-192b, when a combination of isotopes is involved, the limit for the combination shall be derived as follows: Determine for each isotope in the product the ratio between the concentration present in the product and the exempt concentration established in 28-35-198a, Schedule C, for the specific isotope when not in combination. The sum of those ratios may not exceed "1" (i.e., unity).

[1] Values are given only for those materials normally used as gases.

[2] uCi/gm for solids. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-199. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-199a. **Schedule D; Groups of medical uses of radioactive material.** (a) Group I shall include prepared radiopharmaceuticals which are used for diagnostic studies involving measurements of uptake, dilution and excretion and for which the food and drug administration (FDA) has accepted a "notice of claimed investigational exemption for a new drug" (IND) or approved a "new drug application" (NDA).

(b) Group II shall include prepared radiopharmaceuticals which are used for diagnostic studies involving imaging and tumor localizations and for which the food and drug administration (FDA) has accepted a "notice of claimed investigational exemption for a new drug" (IND) or approved a

''new drug application'' (NDA) and any radioactive material in a radiopharmaceutical prepared from a reagent kit listed in K.A.R. 28-35-199a (c) Group III.

(c) Group III shall include generators and reagent kits which are used following the manufacturer's instructions for the preparation of diagnostic radiopharmaceuticals, and for which the food and drug administration (FDA) has accepted a ''notice of claimed investigational exemption for a new drug'' (IND) or approved a ''new drug application'' (NDA).

(d) Group IV shall include prepared radiopharmaceuticals which are used for certain therapeutic uses that do not normally require hospitalization for purposes of radiation safety. The food and drug administration (FDA) shall have accepted a ''notice of claimed exemption for a new drug'' (IND) or approved a ''new drug application'' (NDA) for any radiopharmaceutical used in this group.

(e) Group V shall include prepared radiopharmaceuticals which are used for certain therapeutic uses that normally require hospitalization for purposes of radiation safety and for which the food and drug administration (FDA) has accepted a ''notice of claimed investigational exemption for a new drug'' (IND) or approved a ''new drug application'' (NDA).

(f) Group VI shall include sources and devices containing radioactive material which may be used for the following:

(1) Americium-241 as a sealed source in a device for bone mineral analysis;

(2) Cesium-137 encased in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(3) Cobalt-60 encased in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(4) Gold-198 as seeds for interstitial treatment of cancer;

(5) Iodine-125 as a sealed source in a device for bone mineral analysis;

(6) Iridium-192 as seeds encased in nylon ribbon for interstitial treatment of cancer;

(7) Strontium-90 sealed in an applicator for treatment of superficial eye conditions;

(8) Radon-222 as seeds for topical, interstitial, and intracavitary treatment of cancer;

(9) Radium-226 as a sealed source for topical, interstitial, and intracavitary treatment of cancer;

(10) Iodine-125 as seeds for interstitial treatment of cancer;

(11) Iodine-125 as a sealed source in a portable device for bone imaging and foreign body detection; and

(12) Palladium-103 as a sealed source in seeds for interstitial treatment of cancer. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Oct. 17, 1994.)

28-35-200. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-86-37, Dec. 11, 1985; revoked May 1, 1986.)

28-35-200a. **Schedule E; Possession limits authorized under types b & c specific licenses of broad scope.**

RADIOACTIVE MATERIAL	Column I CURIES	Column II CURIES
Antimony 122	1	0.01
Antimony 124	1	0.01
Antimony 125	1	0.01
Arsenic 73	10	0.1
Arsenic 74	1	0.01
Arsenic 76	1	0.01
Arsenic 77	10	0.1
Barium 131	10	0.1
Barium 140	1	0.01
Beryllium 7	10	0.1
Bismuth 210	0.1	0.001
Bromine 82	10	0.1
Cadmium 109	1	0.01
Cadmium 115m	1	0.01
Cadmium 115	10	0.1
Calcium 45	1	0.01
Calcium 47	10	0.1
Carbon 14	100	1.
Cerium 141	10	0.1
Cerium 143	10	0.1
Cerium 144	0.1	0.001
Cesium 131	100	1.
Cesium 134m	100	1.
Cesium 134	0.1	0.001
Cesium 135	1	0.01
Cesium 136	10	0.1
Cesium 137	0.1	0.001
Chlorine 36	1	0.01
Chlorine 38	100	1.
Chromium 51	100	1.
Cobalt 57	10	0.1
Cobalt 58m	100	1.
Cobalt 58	1	0.01
Cobalt 60	0.1	0.001
Copper 64	10	0.1
Dysprosium 165	100	1.
Dysprosium 166	10	0.1
Erbium 169	10	0.1
Erbium 171	10	0.1
Europium 152 9.2 h	10	0.1

RADIOACTIVE MATERIAL	Column I CURIES	Column II CURIES	RADIOACTIVE MATERIAL	Column I CURIES	Column II CURIES
Europium 152 13 y	0.1	0.001	Praseodymium 142	10	0.1
Europium 154	0.1	0.001	Praseodymium 143	10	0.1
Europium 155	1	0.01	Promethium 147	1	0.01
Fluorine 18	100	1.	Promethium 149	10	0.1
Gadolinium 153	1	0.01	Radium 226	0.01	0.0001
Gadolinium 159	10	0.1	Rhenium 186	10	0.1
Gallium 72	10	0.1	Thenium 188	10	0.1
Germanium 71	100	1.	Rhodium 103m	1,000	10.
Gold 198	10	0.1	Rhodium 105	10	0.1
Gold 199	10	0.1	Rubidium 86	1	0.01
Hafnium 181	1	0.01	Rubidium 87	1	0.01
Holmium 166	10	0.1	Ruthenium 97	100	1.
Hydrogen 3	100	1.	Ruthenium 103	1	0.01
Indium 113m	100	1.	Ruthenium 105	10	0.1
Indium 114m	1	0.01	Ruthenium 106	0.1	0.001
Indium 115m	100	1.	Samarium 151	1	0.01
Indium 115	1	0.01	Samarium 153	10	0.1
Iodine 125	0.1	0.001	Scandium 46	1	0.01
Iodine 126	0.1	0.001	Scandium 47	10	0.1
Iodine 129	0.1	0.001	Scandium 48	1	0.01
Iodine 131	0.1	0.001	Selenium 75	1	0.01
Iodine 132	10	0.1	Silicon 31	10	0.1
Iodine 133	1	0.01	Silver 105	1	0.01
Iodine 134	10	0.1	Silver 110m	0.1	0.001
Iodine 135	1	0.01	Silver 111	10	0.1
Iridium 192	1	0.01	Sodium 22	0.1	0.001
Iridium 194	10	0.1	Sodium 24	1	0.01
Iron 55	10	0.1	Strontium 85m	1,000	10.
Iron 59	1	0.01	Strontium 85	1	0.01
Krypton 85	100	1.	Strontium 89	1	0.01
Krypton 87	10	0.1	Strontium 90	0.01	0.0001
Lanthanum 140	1	0.01	Strontium 91	10	0.1
Lutetium 177	10	0.1	Strontium 92	10	0.1
Manganese 52	1	0.01	Sulphur 35	10	0.1
Manganese 54	1	0.01	Tantalum 182	1	0.01
Manganese 56	10	0.1	Technetium 96	10	0.1
Mercury 197m	10	0.1	Technetium 97m	10	0.1
Mercury 197	10	0.1	Technetium 97	10	0.1
Mercury 203	1	0.01	Technetium 99m	100	1.
Molybdenum 99	10	0.1	Technetium 99	1	0.01
Neodymium 147	10	0.1	Tellurium 125m	1	0.01
Neodymium 149	10	0.1	Tellurium 127m	1	0.01
Nickel 59	10	0.1	Tellurium 127	10	0.1
Nickel 63	1	0.01	Tellurium 129m	1	0.01
Nickel 65	10	0.1	Tellurium 129	100	1.
Niobium 93m	1	0.01	Tellurium 131m	10	0.1
Niobium 95	1	0.01	Tellurium 132	1	0.01
Niobium 97	100	1.	Terbium 160	1	0.01
Osmium 185	1	0.01	Thallium 200	10	0.1
Osmium 191m	100	1.	Thallium 201	10	0.1
Osmium 191	10	0.1	Thallium 202	10	0.1
Osmium 193	10	0.1	Thallium 204	1	0.01
Palladium 103	10	0.1	Thulium 170	1	0.01
Palladium 109	10	0.1	Thulium 171	1	0.01
Phosphorus 32	1	0.01	Tin 113	1	0.01
Platinum 191	10	0.1	Tin 125	1	0.01
Platinum 193m	100	1.	Tungsten 181	1	0.01
Platinum 193	10	0.1	Tungsten 185	1	0.01
Platinum 197m	100	1.	Tungsten 187	10	0.1
Platinum 197	10	0.1	Vanadium 48	1	0.01
Polonium 210	0.01	0.0001	Xenon 131m	1,000	10.
Potassium 42	1	0.01	Xenon 133	100	1.

RADIOACTIVE MATERIAL	Column I CURIES	Column II CURIES
Xenon 135	100	1.
Ytterbium 175	10	0.1
Yttrium 90	1	0.01
Yttrium 91	1	0.01
Yttrium 92	10	0.1
Yttrium 93	1	0.01
Zinc 65	1	0.01
Zinc 69m	10	0.1
Zinc 69	100	1.
Zirconium 93	1	0.01
Zirconium 95	1	0.01
Zirconium 97	1	0.01
Any radioactive material other than alpha emitting radioactive material not listed above.	0.1	0.001

(Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-201. **Schedule F.** (a) Single isotope quantities.

Material	**Microcuries**
Americium-241	.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-58m	10
Cobalt-58	10
Cobalt-60	1
Copper-64	100
Dysprosium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 9.2hr	100
Europium-152 13yr	1
Europium-154	1
Europium-155	10
Fluorine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	100
Gold-198	100
Gold-199	100
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100

Material	Microcuries
Nickel-59	100
Nickel-63	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	.01
Polonium-210	.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	.01
Rhenium-186	100
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-110m	1
Silver-111	100
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	.1
Strontium-91	10
Strontium-92	10
Sulfur-35	100
Tantalum-182	10
Technetium-96	10
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
Thorium (natural)[1]	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
Uranium (natural)[2]	100
Uranium-233	.01
Uranium-234—235	.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zinc-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10
Any alpha-emitting radionuclide not listed above or mixture of alpha-emitters of unknown composition	.01
Any radionuclide other than an alpha-emitting radionuclide that is not listed above or mixtures of beta-emitters of unknown composition	.1

[1] Based on an alpha disintegration rate of Th-232, Th-230 and their daughter products.

[2] Based on an alpha disintegration rate of U-238, U-234 and U-235.

(b) Combinations of isotopes. For the purposes of K.A.R. 28-35-180, when a combination of isotopes in known amounts is involved, the limit for the combination shall be derived by determining, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination shall not exceed unity. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-202. **Schedule H.** Each licensee possessing any of the following quantities of radioactive materials shall comply with K.A.R. 28-35-193b (a). The release fractions listed below shall be used in the consideration of the need for an emergency plan for responding to a release unless other data regarding release fractions in respirable size range is available.

Radioactive material	Release fraction	Quantity (curies)
Actinium-228	0.001	4,000
Americium-241	0.001	2
Americium-242	0.001	2
Americium-243	0.001	2
Antimony-124	0.01	4,000
Antimony-126	0.01	6,000
Barium-133	0.01	10,000
Barium-140	0.01	30,000
Bismuth-207	0.01	5,000
Bismuth-210	0.01	600
Cadmium-109	0.01	1,000
Cadmium-113	0.01	80
Calcium-45	0.01	20,000
Californium-252	0.001	9 (20 mg)
Carbon-14 Non CO	0.01	50,000
Cerium-141	0.01	10,000
Cerium-144	0.01	300
Cesium-134	0.01	2,000
Cesium-137	0.01	3,000
Chlorine-36	0.5	100
Chromium-51	0.01	300,000
Cobalt-60	0.001	5,000
Copper-64	0.01	200,000
Curium-242	0.001	60
Curium-243	0.001	3
Curium-244	0.001	4
Curium-245	0.001	2
Europium-152	0.01	500
Europium-154	0.01	400
Europium-155	0.01	3,000
Germanium-68	0.01	2,000
Gadolinium-153	0.01	5,000
Gold-198	0.01	30,000
Hafnium-172	0.01	400
Hafnium-181	0.01	7,000
Holmium-166m	0.01	100
Hydrogen-3	0.5	20,000
Iodine-125	0.5	10
Iodine-131	0.5	10
Indium-114m	0.01	1,000
Iridium-192	0.001	40,000
Iron-55	0.01	40,000
Iron-59	0.01	7,000
Krypton-85	1.0	6,000,000
Lead-210	0.01	8
Manganese-56	0.01	60,000
Mercury-203	0.01	10,000
Molybdenum-99	0.01	30,000
Neptunium-237	0.001	2
Nickel-63	0.01	20,000
Niobium-94	0.01	300
Phosphorus-32	0.5	100
Phosphorus-33	0.5	1,000
Polonium-210	0.01	10
Potassuim-42	0.01	9,000
Promethium-145	0.01	4,000
Promethium-147	0.01	4,000
Ruthenium-106	0.01	200
Samarium-151	0.01	4,000
Scandium-46	0.01	3,000
Selenium-75	0.01	10,000
Silver-110m	0.01	1,000
Sodium-22	0.01	9,000
Sodium-24	0.01	10,000
Strontium-89	0.01	3,000
Strontium-90	0.01	90
Sulfur-35	0.5	900
Technetium-99	0.01	10,000
Technetium-99m	0.01	400,000
Tellurium-127m	0.01	5,000
Tellurium-129m	0.01	5,000
Terbium-160	0.01	4,000
Thulium-170	0.01	4,000
Tin-113	0.01	10,000
Tin-123	0.01	3,000
Tin-126	0.01	1,000

Radioactive material	Release fraction	Quantity (curies)
Titanium-44	0.01	100
Vanadium-48	0.01	7,000
Xenon-133	1.0	900,000
Yttrium-91	0.01	2,000
Zinc-65	0.01	5,000
Zirconium-93	0.01	400
Zirconium-95	0.01	5,000
Any other beta-gamma emitter	0.01	10,000
Mixed fission products	0.01	1,000
Mixed corrosion products	0.01	10,000
Equipment contaminated with radioactive material beta-gamma emissions equivalent to	0.001	10,000
Irradiated material, in any form which is not solid and noncombustible	0.01	10,000
Irradiated material, which is solid and noncombustible	0.001	10,000
Mixed radioactive waste, beta-gamma emissions equivalent to	0.01	1,000
Packaged mixed waste, beta-gamma[1]	0.001	10,000
Any other material emitting alpha radiation equivalent to	0.001	2
Equipment contaminated with radioactive material alpha emissions equivalent to	0.0001	20
Packaged waste containing material emitting alpha[1] radiation	0.0001	20
Combinations of radioactive materials listed above[2]		

[1] Waste packaged in type B containers shall not require an emergency plan.

[2] For combinations of radioactive materials, the licensee shall comply with K.A.R. 28-35-193b(a) if the sum of the ratios of the quantity of each radioactive material authorized to the quantity listed for that material in Schedule C exceeds one. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-203. **Schedule G—Criteria relating to use of financial tests and parent company guarantees for providing reasonable assurance of funds for decommissioning.** (a) Each applicant or licensee providing assurance of the availability of funds for decommissioning based on a parent company guarantee that funds will be available for decommissioning costs based on a demonstration that the parent company passes a financial test shall meet the following standards:

(b) Each licensee or applicant applying to the department for recognition of a parent company guarantee for the purposes of complying with the requirements of 28-35-180a(e)(9)(B) shall be required to show its parent company guarantee meets the following criteria:

(1) Each parent company shall meet two of the following three ratios.

(A) a ratio of total liabilities to net worth which is less than 2.0;

(B) a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities which is greater than 0.1; or

(C) a ratio of current assets to current liabilities which is greater than 1.5.

(2) Each parent company shall have net working capital and tangible net worth that each are equal to a minimum of six times the current decommissioning cost estimates, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a.

(3) Each parent company shall have assets located in the United States amounting to at least 90 percent of the company's total assets or at least six times the current decommissioning cost estimates, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a.

(4) Each parent company shall have:

(A) A current rating for its most recent bond issuance of AAA, AA, A, or BBB as issued by standard and poor's or Aaa, Aa, A, or Baa as issued by moody's;

(B) A tangible net worth at least six times the current decommissioning cost estimate, or the prescribed amount if a certification is used based on the requirements of K.A.R. 28-35-180a;

(C) A tangible net worth of at least $10 million; and

(D) Assets located in the United States amounting to at least 90 percent of the company's total assets or at least six times the current decommissioning cost estimates, or the prescribed

amount if certification is used based on the requirements of K.A.R. 28-35-180a.

(c) The parent company's independent certified public accountant shall compare the data used by the parent company in the financial test, which shall be derived from the independently audited, year end financial statements for the latest fiscal year, with the amounts in such financial statement. If any matters come to the auditor's attention which cause the auditor to believe that the data specified in the financial test should be adjusted and that the company no longer passes the test, the licensee shall notify the department within 90 days of the date the auditor identifies such a matter.

(d) After the initial financial test, the parent company shall pass the test within 90 days after the close of each succeeding fiscal year.

(1) If the parent company no longer meets the requirements of subsection (a) of this Schedule G, the licensee shall notify the department of its intent to establish alternate financial assurance as specified in the regulations.

(2) The notice shall be sent by certified mail within 90 days after the end of the fiscal year for which the year end financial data shows that the parent company no longer meets the financial test requirements.

(3) The licensee shall provide alternate financial assurance within 120 days after the end of such a fiscal year.

(e) Each parent company guarantee obtained by an applicant or licensee shall contain terms which provide the following information.

(1) The parent company guarantee shall remain in force unless the guarantor sends notice of cancellation by certified mail to the licensee and the department. The guarantee shall not be canceled during the 120 days beginning on the date of receipt of the notice of cancellation by both the licensee and the department, as evidenced by the return receipts.

(2) If the licensee fails to provide alternate financial assurance within 90 days after receipt of a notice of cancellation of the parent company guarantee by the licensee and the department, the guarantor shall provide such alternative financial assurance in the name of the licensee.

(3) The parent company guarantee and financial test provisions shall remain in effect until the department has terminated the license.

(4) If a trust is established for decommissioning costs, the trustee and trust shall be acceptable to the department. An acceptable trustee may be an appropriate state or federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-204 to 28-35-210. **Reserved.**

PART 4.—STANDARDS FOR PROTECTION AGAINST RADIATION

28-35-211. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-211a. **Persons to whom the standards apply.** (a) Except as specifically provided in other parts of these regulations, these regulations shall apply to persons licensed or registered by the department to receive, possess, use, transfer, or dispose of sources of radiation. The limits in these regulations shall not apply to:

(1) doses due to background radiation;

(2) exposure of patients to radiation for the purpose of medical diagnosis or therapy; or

(3) voluntary participation in medical research programs.

(b) Nothing in these regulations shall be construed as limiting actions that may be necessary to protect health and safety. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Oct. 17, 1994.)

28-35-211b. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; revoked Sept. 20, 1993.)

28-35-211c. **Application of new regulations.** (a) Any existing license or registration condition that is more restrictive than regulations adopted January 1, 1994 shall remain in force until there is an amendment or renewal of the license or registration.

(b) If a license or registration condition exempts a licensee or registrant from a provision of a regulation in effect on or before January 1, 1995, it also exempts the licensee or registrant from the corresponding provision of the regulation after that date.

(c) If a license or registration condition cites provisions of the regulations in effect prior to January 1, 1995, which do not correspond to any pro-

visions of these regulations, the license or registration condition shall remain in force until there is an amendment or renewal of the license or registration that modifies or removes this condition. (Authorized by and implementing K.S.A. 1993 Supp. 48-1603, 48-1607; effective Oct. 17, 1994.)

28-35-211d. **Radiation protection programs.** (a) Each licensee or registrant shall develop, document, and implement a radiation protection program sufficient to ensure compliance with the provisions of these regulations.

(b) The licensee or registrant shall use, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and public doses that are as low as is reasonably achievable (ALARA).

(c) The licensee or registrant shall, at intervals not to exceed 12 months, review the radiation protection program content and implementation. (Authorized by and implementing K.S.A. 1993 Supp. 48-1603, 48-1607; effective Oct. 17, 1994.)

28-35-212. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-212a. **Occupational dose limits for adults.** (a) Each licensee or registrant shall control the occupational dose to individual adults, except for planned special exposures pursuant to K.A.R. 28-35-212f, to the following dose limits.

(1) The annual limit shall be the more limiting of:

(A) the total effective dose equivalent being equal to 0.05 Sv (5 rem); or

(B) the sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 0.50 Sv (50 rem).

(2) The annual limits to the lens of the eye, to the skin, and to the extremities shall be:

(A) an eye dose equivalent of 0.15 Sv (15 rem); and

(B) a shallow dose equivalent of 0.50 Sv (50 rem) to the skin or to any extremity.

(b) Doses received in excess of the annual limits, including doses received during accidents, emergencies, and planned special exposures, shall be subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime.

(c) The deep dose equivalent and shallow dose equivalent assigned to an individual shall be assessed using that individual's monitoring device if the device is in the region of highest potential exposure. If the device is not in the region of the portion of the body receiving the highest exposure, the assigned deep dose equivalent shall be determined as follows:

(1) the deep dose equivalent, eye dose equivalent and shallow dose equivalent may be assessed from surveys; or

(2) the deep dose equivalent, eye dose equivalent and shallow dose equivalent may be assessed from other radiation measurements.

(d) Derived air concentration (DAC) and annual limit on intake (ALI) values, in appendix B, table I, published in ''Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation,'' effective April, 1994, shall be used to determine the individual's dose and to demonstrate compliance with the occupational dose limits.

(e) Notwithstanding the annual dose limits, the licensee shall limit the soluble uranium intake by an individual to 10 milligrams in a week in consideration of chemical toxicity, in accordance with footnote 3 or appendix B published in ''Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation,'' effective April, 1994.

(f) Each licensee or registrant shall reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept 20, 1993; amended Oct. 17, 1994.)

28-35-212b. **Compliance with requirements for summation of external and internal doses.** (a) (1) If the licensee or registrant is required to monitor pursuant to both K.A.R. 28-35-217b (a) and (d), the licensee or registrant shall demonstrate compliance with the dose limits by summing external and internal doses.

(2) The licensee or registrant may demonstrate compliance with the requirements for summation of external and internal doses pursuant to K.A.R. 28-35-212b(b), (c), and (d). The dose equivalents for the lens of the eye, the skin, and the extrem-

ities shall not be included in the summation, but shall be subject to separate limits.

(3) If the licensee or registrant is required to monitor only pursuant to K.A.R. 28-35-217b(a) or only pursuant to K.A.R. 28-35-217b(d), then summation is not required to demonstrate compliance with the dose limits.

(b) Intake by inhalation. If the only intake of radionuclides is by inhalation, the total effective dose equivalent limit is not exceeded if the sum of the deep dose equivalent divided by the total effective dose equivalent limit, and one of the following, does not exceed unity:

(1) the sum of the fractions of the inhalation ALI for each radionuclide;

(2) the total number of derived air concentration-hours (DAC-hour) for all radionuclides divided by 2,000; or

(3) the sum of the calculated committed effective dose equivalents to all significantly irradiated organs or tissues (T) calculated from bioassay data using appropriate biological models and expressed as a fraction of the annual limit. For purposes of this requirement, an organ or tissue is deemed to be significantly irradiated if, for that organ or tissue, the product of the weighting factors, w_T, and the committed dose equivalent, $H_{T.50}$, per unit intake is greater than 10 percent of the maximum weighted value of H_{50}, that is, $w_T H_{T.50}$, per unit intake for any organ or tissue.

(c) Intake by oral ingestion. If the occupationally exposed individual receives an intake of radionuclides by oral ingestion greater than 10 percent of the applicable oral ALI, the licensee or registrant shall account for this intake and include it in demonstrating compliance with the limits.

(d) Intake through wounds or absorption through skin. The licensee or registrant shall evaluate, and to the extent practical, account for intakes through wounds or skin absorption. The intake through intact skin has been included in the calculation of DAC for hydrogen-3 and does not need to be evaluated or accounted for pursuant to this subsection. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-212c. **Determination of external dose from airborne radioactive material.** (a) When determining the dose from airborne radioactive material, the licensee or registrant shall include the contribution to the deep dose equivalent, eye dose equivalent, and shallow dose equivalent from external exposure to the radioactive cloud.

(b) Airborne radioactivity measurements and DAC values shall not be used as the primary means to assess the deep dose equivalent when the airborne radioactive material includes radionuclides other than noble gases or if the cloud of airborne radioactive material is not relatively uniform. The determination of the deep dose equivalent to an individual shall be based upon measurements using instruments or individual monitoring devices. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-212d. **Determination of internal exposure.** (a) For purposes of assessing dose used to determine compliance with occupational dose equivalent limits, each licensee or registrant shall, when required pursuant to K.A.R. 28-35-217b, take suitable and timely measurements of:

(1) concentrations of radioactive materials in air in work areas;

(2) quantities of radionuclides in the body;

(3) quantities of radionuclides excreted from the body; or

(4) combinations of these measurements.

(b) Unless respiratory protective equipment is used, as provided in K.A.R. 28-35-212g, or the assessment of intake is based on bioassays, the licensee or registrant shall assume that an individual inhales radioactive material at the airborne concentration in which the individual is present.

(c) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior of the material in an individual is known, the licensee or registrant may:

(1) use that information to calculate the committed effective dose equivalent, and if used, the licensee or registrant shall document that information in the individual's record;

(2) prior to approval of the department, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material; and

(3) separately assess the contribution of fractional intakes of Class D, W, or Y compounds of a given radionuclide to the committed effective dose equivalent.

(d) If the licensee or registrant chooses to assess intakes of class Y material using the measurements given in K.A.R. 28-35-212d(a)(2) or (3), the

licensee or registrant may delay the recording and reporting of the assessments for periods up to seven months, unless otherwise required by K.A.R. 28-35-229a or K.A.R. 28-35-230a, in order to make additional measurements basic to the assessments.

(e) If the identity and concentration of each radionuclide in a mixture are known, the fraction of the DAC applicable to the mixture for use in calculating DAC-hours shall be either:

(1) the sum of the ratios of the concentration to the appropriate DAC value, that is, D, W, or Y, from appendix B published in "Kansas Department of Health and Environment Appendices to Part 4: Standard for Protection Against Radiation," effective April, 1994 for each radionuclide in the mixture; or

(2) the ratio of the total concentration for all radionuclides in the mixture to the most restrictive DAC value for any radionuclide in the mixture.

(f) If the identity of each radionuclide in a mixture is known, but the concentration of one or more of the radionuclides in the mixture is not known, the DAC for the mixture shall be the most restrictive DAC of any radionuclide in the mixture.

(g) When a mixture of radionuclides in air exists, a licensee or registrant may disregard certain radionuclides in the mixture if all of the following requirements are met:

(1) the licensee or registrant uses the total activity of the mixture in demonstrating compliance with the dose limits in K.A.R. 28-35-212b and in complying with the monitoring requirements in K.A.R. 28-35-217b(d);

(2) the concentration of any radionuclide disregarded is less than 10 percent of its DAC; and

(3) the sum of these percentages for all of the radionuclides disregarded in the mixture does not exceed 30 percent.

(h) When determining the committed effective dose equivalent, the following information may be considered.

(1) In order to calculate the committed effective dose equivalent, the licensee or registrant may assume that the inhalation of one ALI, or an exposure of 2,000 DAC-hours, results in a committed effective dose equivalent of 0.05 Sv (5 rem) for radionuclides that have their ALIs or DACs based on the committed effective dose equivalent.

(2) For an ALI and the associated DAC determined by the nonstochastic organ dose limit of 0.50 Sv (50 rem), the intake of radionuclides that would result in a committed effective dose equivalent of 0.05 Sv (5 rem), that is, the stochastic ALI, is listed in parentheses appendix B, table I in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994. The licensee or registrant may, as a simplifying assumption, use the stochastic ALI to determine committed effective dose equivalent. However, if the licensee or registrant uses the stochastic ALI, the licensee or registrant shall also demonstrate that the limit in K.A.R. 28-35-212a(a)(1)(ii) is met. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-212e. **Determination of prior occupational dose.** (a) For each individual who may enter the licensee's or registrant's restricted or controlled area and is likely to receive, in a year, an occupational dose requiring monitoring pursuant to K.A.R. 28-35-217b, the licensee or registrant shall:

(1) determine the occupational radiation dose received during the current year; and

(2) attempt to obtain the records of lifetime cumulative occupational radiation dose.

(b) Prior to permitting an individual to participate in a planned special exposure, the licensee or registrant shall determine:

(1) the internal and external doses from all previous planned special exposures;

(2) all doses in excess of the limits, including doses received during accidents and emergencies, by the individual; and

(3) all lifetime cumulative occupational radiation dose.

(c) In complying with the requirements of K.A.R. 28-35-212e(a) a licensee or registrant may:

(1) accept, as a record of the occupational dose that the individual received during the current year, a written signed statement from the individual, or from the individual's most recent employer for work involving radiation exposure, that discloses the nature and the amount of any occupational dose that the individual received during the current year;

(2) accept, as the record of lifetime cumulative radiation dose, an up-to-date record on a form prescribed by the department or an equivalent form, signed by the individual and countersigned by an appropriate official of the most recent employer for work involving radiation exposure, or

the individual's current employer, if the individual is not employed by the licensee or registrant; and

(3) obtain reports of the individual's dose equivalent from the most recent employer for work involving radiation exposure, or the individual's current employer, if the individual is not employed by the licensee or registrant, by telephone, telegram, facsimile, or letter. The licensee or registrant shall request a written verification of the dose data if the authenticity of the transmitted report cannot be established.

(d) (1) The licensee or registrant shall record the exposure history, as required by K.A.R. 28-35-212e(a), on a form prescribed by the department, or on a clear and legible record which includes all the information required on that form. The form or record shall show each period in which the individual received occupational exposure to radiation or radioactive material and shall be signed by the individual who received the exposure. For each period for which the licensee obtains reports, the licensee or registrant shall use the dose shown in the report in preparing the history. For any period in which the licensee or registrant does not obtain a report, the licensee or registrant shall place a notation on history indicating the periods of time for which data are not available.

(2) Licensees or registrants shall not be required to reevaluate the separate external dose equivalents and internal committed dose equivalents or intakes of radionuclides assessed pursuant to the regulations in effect before January 1, 1994. Although occupational exposure histories obtained and recorded before January 1, 1994, did not include effective dose equivalent, the histories may be used in the absence of specific information on the intake of radionuclides by the individual.

(e) If the licensee or registrant is unable to obtain a complete record of an individual's current and previously accumulated occupational dose, the licensee or registrant shall assume:

(1) in establishing administrative controls under K.A.R. 28-35-212a(f) for the current year, that the allowable dose limit for the individual has been reduced by 12.5 mSv (1.25 rem) for each quarter for which records were unavailable and the individual was engaged in activities that could have resulted in occupational radiation exposure; and

(2) that the individual is not available for planned special exposures.

(f) The licensee or registrant shall retain the records of exposure history until the department terminates each pertinent license or registration requiring this record. The licensee or registrant shall retain information used in preparing records of exposure history for three years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-212f. **Planned special exposures.** (a) A licensee or registrant may authorize an adult worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in K.A.R. 28-35-212a.

(b) The authorization of doses under K.A.R. 28-35-212f(a), called planned special exposure, shall only be permitted if each of the following conditions is satisfied.

(1) The licensee or registrant shall authorize a planned special exposure only in an exceptional situation when alternatives that might avoid the higher exposure are unavailable or impractical.

(2) The licensee or registrant, and employer if the employer is not the licensee or registrant, shall specifically authorize the planned special exposure, in writing, before the exposure occurs.

(3) Before a planned special exposure, the licensee or registrant shall ensure that each individual involved is:

(A) informed of the purpose of the planned operation;

(B) informed of the estimated doses and associated potential risks and specific radiation levels or other conditions that might be involved in performing the task; and

(C) instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

(4) Prior to permitting an individual to participate in a planned special exposure, the licensee or registrant shall ascertain prior doses as required by K.A.R. 28-35-212e during the lifetime of the individual for each individual involved.

(5) Subject to K.A.R. 28-35-212a(b), the licensee or registrant shall not authorize a planned special exposure that would cause an individual to receive a dose from all planned special exposures and all doses in excess of the limits to exceed:

(A) the numerical values of any of the dose limits in K.A.R. 28-35-212a in any year; or

(B) five times the annual dose limits in K.A.R. 28-35-212a during the individual's lifetime.

(6) The licensee or registrant shall maintain records of the conduct of a planned special exposure in accordance with K.A.R. 28-35-227g and

shall submit a written report in accordance with K.A.R. 28-35-230c.

(7) The licensee or registrant shall record the best estimate of the dose resulting from the planned special exposure in the individual's record and shall inform the individual, in writing, of the dose within 30 days from the date of the planned special exposure. The dose from planned special exposures shall not be considered in controlling future occupational dose of the individual pursuant to K.A.R. 28-35-212a but shall be included in evaluations required by K.A.R. 28-35-212f(b)(4) and (5). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-212g. **Respiratory protection and controls to restrict internal exposure in restricted areas.** (a) Use of process or other engineering controls. The licensee or registrant shall use, to the extent practicable, process or other engineering controls, such as containment or ventilation, to control the concentrations of radioactive material in air.

(b) Use of other controls. When it is not practicable to apply process or other engineering controls to control the concentrations of radioactive material in air to values below those that define an airborne radioactivity area, the licensee or registrant shall, consistent with maintaining the total effective dose equivalent ALARA, increase monitoring and limit intakes by one or more of the following means:

(1) control of access;

(2) limitation of exposure times;

(3) use of respiratory protection equipment; or

(4) other controls.

(c) Use of individual respiratory protection equipment.

(1) If the licensee or registrant uses respiratory protection equipment to limit intakes pursuant to K.A.R. 28-35-212g(b), the following conditions shall apply.

(A) Except as provided in K.A.R. 28-35-212g(c)(1)(B), the licensee or registrant shall use only respiratory protection equipment that is tested and certified or had certification extended by the national institute for occupational safety and health and the mine safety and health administration (NIOSH/MSHA).

(B) If the licensee or registrant wishes to use equipment that has not been tested or certified by the NIOSH/MSHA or has not had certification extended by the NIOSH/MSHA, or for which there is no schedule for testing extended by the NIOSH/MSHA, or for which there is no schedule for testing or certification, the licensee or registrant shall submit an application for authorized use of that equipment, including a demonstration by testing, or a demonstration on the basis of reliable test information, that the material and performance characteristics of the equipment are capable of providing the proposed degree of protection under anticipated conditions of use.

(C) The licensee or registrant shall implement and maintain a respiratory protection program that includes:

(i) air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate exposures;

(ii) surveys and bioassays, as appropriate, to evaluate actual intakes;

(iii) testing of respirators for operability immediately prior to each use;

(iv) written procedures regarding selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and recordkeeping; and

(v) determination by a physician prior to initial fitting of respirators, and at least every 12 months thereafter, that the individual user is physically able to use the respiratory protection equipment.

(D) The licensee or registrant shall issue a written policy statement on respirator usage covering:

(i) the use of process or other engineering controls, instead of respirators;

(ii) routine, nonroutine, and emergency use of respirators; and

(iii) length of periods of respirator use and relief from respirator use.

(E) The licensee or registrant shall advise each respirator user that the user may leave the area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communication failure, significant deterioration of operating conditions, or any other conditions that might require such relief; and

(F) the licensee or registrant shall use respiratory protection equipment within the equipment manufacturer's expressed limitations for type and mode of use and shall provide proper visual, communication, and other special capabil-

ities, such as adequate skin protection, when needed.

(2) When estimating exposure of individuals to airborne radioactive materials, the licensee or registrant may make allowance for respiratory protection equipment used to limit intakes pursuant to K.A.R. 28-35-212g(b), provided that the following conditions, in addition to those in K.A.R. 28-35-212g(c)(1), are satisfied.

(A) (i) The licensee or registrant shall select respiratory protection equipment that provides a protection factor, specified in appendix A protection factor for registrant published in ''Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation,'' effective April, 1994, greater than the multiple by which peak concentrations of airborne radioactive materials in the working area are expected to exceed the values specified in appendix B, table I, column 3 published in ''Kansas Department of Health and Environment Appendixes to Part 4 Standards for Protection Against Radiation,'' effective April, 1994. However, if the selection of respiratory protection equipment with a protection factor greater than the peak concentration is inconsistent with the goal specified in K.A.R. 28-35-212g(b) of keeping the total effective dose equivalent ALARA, the licensee or registrant may select respiratory protection equipment with a lower protection factor provided that such a selection would result in a total effective dose equivalent that is ALARA.

(ii) The concentration of radioactive material in the air that is inhaled when respirators are worn may be initially estimated by dividing the average concentration in air, during each period of uninterrupted use, by the protection factor. If the exposure is later found to be greater than initially estimated, the corrected value shall be used; if the exposure is later found to be less than initially estimated, the corrected value may be used.

(B) The licensee or registrant shall obtain authorization from the department before assigning respiratory protection factors in excess of those specified in K.A.R. 28-35-232a appendix A. The department may authorize a licensee or registrant to use higher protection factors on receipt of an application that:

(i) describes the situation for which a need exists for higher protection factors; and

(ii) demonstrates that the respiratory protection equipment provides these higher protection factors under the proposed conditions of use.

(3) In an emergency, the licensee or registrant shall use as emergency equipment only respiratory protection equipment that has been specifically certified or had certification extended for emergency use by the NIOSH/MSHA.

(4) The licensee or registrant shall notify the department in writing at least 30 days before the date that respiratory protection equipment is first used pursuant to either K.A.R. 28-35-212g(1) or (2). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-213. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-213a. **Occupational dose limits for minors.** The annual occupational dose limit for a minor shall be 10 percent of the annual occupational dose limits specified for an adult worker in K.A.R. 28-35-212a. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-213b. **Dose to an embryo/fetus.** (a) The licensee or registrant shall ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 5 mSv (0.5 rem).

(b) The licensee or registrant shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in K.A.R. 28-35-213b(a).

(c) The dose to an embryo/fetus shall be taken as the sum of:

(1) the deep dose equivalent to the declared pregnant woman; and

(2) the dose to the embryo/fetus for radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

(d) If by the time the woman declares pregnancy to the licensee or registrant, the dose to the embryo/fetus has exceeded 4.5 mSv (0.45 rem), the licensee or registrant shall be deemed to be in compliance with K.A.R. 28-35-213b(a) if the additional does to the embryo/fetus does not exceed 0.50 mSv (0.05 rem) during the remainder of the pregnancy. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994).

28-35-214. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended

May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-214a. **Dose limits for individual members of the public.** Each licensee or registrant shall conduct operations so that:

(1) the total effective dose equivalent to individual members of the public from the licensed or registered operation does not exceed 1 mSv (0.1 rem) in a year, exclusive of the dose contribution from the licensee's or registrant's disposal of radioactive material into sanitary sewerage in accordance with K.A.R. 28-35-224a; and

(2) the dose in any unrestricted area from external sources does not exceed 0.02 mSv (0.002 rem) in any one hour.

(b) If the licensee or registrant permits members of the public to have access to controlled areas, the limits for members of the public shall continue to apply to those individuals.

(c) A licensee, registrant, or an applicant for a license or registration may apply for prior department authorization to operate up to an annual dose limit for an individual member of the public of 5 mSv (0.5 rem). This application shall include the following information:

(1) demonstration of the need for and the expected duration of operations in excess of the limit in K.A.R. 28-35-214a(a)(1) or (2);

(2) the licensee's or registrant's program to assess and control dose within the 5 mSv (0.5 rem) annual limit; and

(3) the procedures to be followed to maintain the dose ALARA. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993, amended Oct. 17, 1994.)

28-35-214b. **Compliance with dose limits for individual members of the public.** (a) The licensee or registrant shall make or cause to be made surveys of radiation levels in unrestricted and controlled areas and radioactive materials in effluents released to unrestricted and controlled areas to demonstrate compliance with the dose limits for individual members of the public in K.A.R. 28-35-214a.

(b) A licensee or registrant shall show compliance with the annual dose limit in K.A.R. 28-35-214a by:

(1) demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed or registered operation does not exceed the annual dose limit; or

(2) demonstrating that:

(A) the annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994; and

(B) if an individual were continually present in an unrestricted area, the dose from external sources would not exceed 0.02 mSv (0.002 rem) in an hour and 0.50 mSv (0.05 rem) in a year.

(c) Upon approval from the department, the licensee or registrant may adjust the effluent concentration values in appendix B, table II published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994, for members of the public, to take into account the actual physical and chemical characteristics of the effluents, including aerosol size distribution, solubility, density, radioactive decay equilibrium, and chemical form. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-215. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-215a. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; revoked Oct. 17, 1994.)

28-35-216. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-216a. **Leak tests.** (a) Each sealed radioactive source possessed under the provisions of a specific license, other than hydrogen 3 (tritium), that has a half-life greater than 30 days and that is in any form other than gas, shall be tested for leakage, contamination or both prior to initial use, and at intervals specified by the license. If there is reason to suspect that a sealed source might have been damaged, it shall be tested for leakage before further use.

(b) Leak tests shall be capable of detecting the presence of 0.005 microcurie of removable con-

tamination. Any test conducted pursuant to subsection (a) of this regulation which reveals the presence of 0.005 microcurie or more of removable contamination shall be considered evidence that the sealed source is leaking. The licensee shall immediately withdraw the source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with K.A.R. 28-35-190. When sealed sources are permanently mounted in devices or equipment, tests for contamination and leakage may be made by wiping appropriate accessible surfaces and measuring these wipes for transferred contamination. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985.)

28-35-217. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-217a. **Conditions requiring individual monitoring of external and internal occupational dose.** (a) Each licensee or registrant shall monitor exposures from sources of radiation at levels sufficient to demonstrate compliance with the occupational dose limits of these regulations. At a minimum, each licensee or registrant shall monitor occupational exposure to radiation and shall supply and require the use of individual monitoring devices by:

(1) any adult likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of the limits in K.A.R. 28-35-212a;

(2) any minor or declared pregnant woman likely to receive, in one year from sources external to the body, a dose in excess of 10 percent of any of the applicable limits in K.A.R. 28-35-213a or K.A.R. 28-35-213b; and

(3) any individual entering a high or very high radiation area.

(b) Except as noted in this regulation, each personnel dosimeter that requires processing to determine the radiation dose and is utilized by the licensee or registrant to comply with this regulation, with other applicable parts of these regulations, or with conditions specified in a license or a certificate of registration, shall be processed and evaluated by a dosimetry processor currently listed in the "national voluntary laboratory accreditation program 1992 directory" (NIST Special Publication 810, published April 1992) of the national institute of standards and technology, and approved in this accreditation process for the type of radiation or radiations that most closely approximate the type of radiation or radiations for which the individual wearing the dosimeter is monitored.

(c) The requirements of this regulation shall not apply to personnel dosimeters used to measure the dose to hands and forearms or feet and ankles.

(d) To determine compliance with K.A.R. 28-35-212d, each licensee or registrant shall monitor the occupational intake of radioactive material by and assess the committed effective dose equivalent to:

(1) any adult likely to receive, in one year, an intake in excess of 10 percent of the applicable ALI in appendix B, table I, columns 1 and 2 published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994; and

(2) any minor or declared pregnant woman likely to receive, in one year, a committed effective dose equivalent in excess of 0.50 mSv (0.05 rem). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-217b. **General.** (a) Each licensee or registrant shall make, or cause to be made, surveys that:

(1) provide measurements or evaluations demonstrating compliance with these regulations; and

(2) are necessary under the circumstances to evaluate:

(A) radiation levels;

(B) concentrations or quantities of radioactive material; and

(C) the potential radiological hazards that could be present.

(b) The licensee or registrant shall ensure that instruments and equipment used for quantitative radiation measurements, are calibrated at intervals not to exceed 12 months, for the type of radiation measured.

(c) The licensee or registrant shall ensure that adequate precautions are taken to prevent a deceptive exposure of an individual monitoring device. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-218. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-218a. **Bioassays.** Where necessary or desirable in order to aid in determining the extent of an individual's exposure to concentrations of radioactive material, a licensee may be required by the department, through license provisions or an order, to make available to the individual appropriate bioassay services and to furnish a copy of the reports of those services to the department. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993.)

28-35-219. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-219a. **Caution signs and labels.** (a) General:

(1) Except as otherwise authorized by the department, symbols prescribed by this regulation shall use the conventional radiation caution colors (magenta or purple on yellow background). The symbol shall be the conventional three-blade design with the phrases and graphic set out below:

CAUTION (or DANGER)

RADIATION SYMBOL

1. Cross-hatch area shall be magenta, purple, or black.
2. Background shall be yellow.

(2) In addition to the contents of signs and labels prescribed in this section, any licensee or registrant may provide on or near signs and labels any additional information which may be appropriate in aiding individuals to minimize exposure to radiation.

(b) Radiation areas. Each radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (or DANGER)

RADIATION AREA

(c) High radiation areas.

(1) Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (or DANGER)

HIGH RADIATION AREA

(2) Each registrant or licensee shall assure that the entrance or access point to a high radiation area is:

(A) equipped with a control device that, upon entry into the area, causes the level of radiation to be reduced below that at which an individual might receive a deep dose equivalent of 100 millirems (1.0 mSv) in one hour at 30 centimeters from any surface the radiation penetrates; or

(B) equipped with a control device that energizes a conspicuous visible or audible alarm signal in such a manner that the individual entering the high radiation area and the licensee or a supervisor of the activity are made aware of the entry; or

(C) required to be locked except during periods when access to the area is required, with positive control over each individual entry.

(3) The controls required by K.A.R. 28-35-219a(c)(2) and K.A.R. 28-35-219a(d)(2) shall be established in such a way that no individual will be prevented from leaving a high radiation area or a very high radiation area.

(4) If a high radiation area is established for a period of 30 days or less, direct surveillance to prevent unauthorized entry may be substituted for the controls required by paragraph (c)(2) of this regulation.

(5) Any licensee or registrant may apply to the department for approval of methods not included in paragraphs (c)(2), (4) and (6) of this regulation. The proposed alternatives shall be approved by the department if the licensee or registrant demonstrates that the alternative methods of control

will prevent unauthorized entry into a high radiation area, and that the requirement of paragraph (c)(3) of this regulation is met.

(6) In place of the controls required by K.A.R. 28-35-219a for a high radiation area, the licensee or registrant may substitute continuous direct or electronic surveillance that is capable of preventing unauthorized entry.

(7) The licensee or registrant shall not be required to control each entrance or access point to a room or other area that is a high radiation area solely because of the presence of radioactive materials prepared for transport and packaged and labeled in accordance with the regulations of the U.S. department of transportation provided that:

(A) the packages do not remain in the area longer than three days; and

(B) the dose rate at one meter from the external surface of any package does not exceed 0.1 mSv (0.01 rem) per hour.

(8) The licensee or registrant shall not be required to control entrance or access to rooms or other areas in hospitals solely because of the presence of patients containing radioactive material, provided that there are personnel in attendance who are taking the necessary precautions to prevent the exposure of individuals to radiation or radioactive material in excess of the established limits in these regulations and to operate within the ALARA provisions of the licensee's or registrant's radiation protection program.

(9) The registrant shall not be required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a high radiation area as described in K.A.R. 28-35-219a if the registrant has met all the specific requirements for access and control specified in other applicable regulations, K.A.R. 28-35-274 through K.A.R. 28-35-289 for industrial radiography, K.A.R. 28-35-241 through K.A.R. 28-35-250 for x-rays in the healing arts, and K.A.R. 28-35-308 through K.A.R. 28-35-319 for particle accelerators.

(d) Very high radiation areas.

(1) Each very high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

GRAVE DANGER

VERY HIGH RADIATION AREA

(2) Each registrant or licensee shall institute measures to ensure that an individual is not able to gain unauthorized or inadvertent access to an area in which radiation levels could be encountered at 5 Gy (500 rad) or more in one hour at one meter from a source of radiation or any surface through which the radiation penetrates, a very high radiation area.

(A) This requirement shall not apply to rooms or areas in which diagnostic x-ray systems are the only source of radiation, or to non-self-shielded irradiators.

(B) The registrant shall not be required to control entrance or access to rooms or other areas containing sources of radiation capable of producing a very high radiation area, as described in K.A.R. 28-35-219a, if the registrant has met all the specific requirements for access and control specified in other applicable regulations K.A.R. 28-35-274 through 28-35-289 for industrial radiography, K.A.R. 28-35-241 through 28-35-250 for x-rays in the healing arts, and K.A.R. 28-35-308 through 319 for particle accelerators.

(3) Control of access to very high radiation areas; irradiators.

(A) K.A.R. 28-35-219a(d)(3) shall apply to licensees or registrants with sources of radiation in non-self-shielded irradiators. K.A.R. 28-35-219a(d)(3) shall not apply to sources of radiation that are used in teletherapy, in industrial radiography, or in completely self-shielded irradiators in which the source of radiation is both stored and operated within the same shielding radiation barrier and, in the designed configuration of the irradiator, is always physically inaccessible to any individual and cannot create a high level of radiation in an area that is accessible to any individual.

(B) Each area in which there may exist radiation levels in excess of 5 Gy (500 rad) in one hour at one meter from a source of radiation that is used to irradiate materials shall be equipped with entry control devices which:

(i) function automatically to prevent any individual from inadvertently entering a very high radiation area;

(ii) permit deliberate entry into the area only after a control device is actuated that causes the radiation level within the area, from the source of radiation, to be reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in one hour; and

(iii) prevent operation of the source of radiation if it would produce radiation levels in the area that could result in a deep dose equivalent to an

individual in excess of 1 mSv (0.1 rem) in one hour.

(C) Additional control devices shall be provided so that, upon failure of the entry control devices to function as required by K.A.R. 28-35-219(d)(3)(B):

(i) the radiation level within the area, from the source of radiation, is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in one hour; and

(ii) conspicuous visible and audible alarm signals are generated to make an individual attempting to enter the area aware of the hazard and at least one other authorized individual who is physically present, familiar with the activity, and prepared to render or summon assistance, aware of the failure of the entry control devices.

(D) The licensee or registrant shall provide control devices so that, upon failure or removal of physical radiation barriers other than the sealed sources shielded storage container:

(i) the radiation level from the source of radiation is reduced below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in one hour; and

(ii) conspicuous visible and audible alarm signals are generated to make potentially affected individuals aware of the hazard and the licensee, or registrant or at least one other individual who is familiar with the activity and prepared to render or summon assistance, aware of the failure or removal of the physical barrier.

(E) When the shield for stored sealed sources is a liquid, the licensee or registrant shall provide means to monitor the integrity of the shield and to automatically signal the loss of adequate shielding.

(F) Physical radiation barriers that comprise permanent structural components, including walls, that have no credible probability of failure or removal in ordinary circumstances shall not be required to comply with K.A.R. 28-35-219a(d)(3)(D) and (E).

(G) Each area shall be equipped with devices that automatically generate conspicuous visible and audible alarm signals to alert personnel in the area before the source of radiation can be put into operation and in time for any individual in the area to operate a clearly identified control device, which shall be installed in the area and which shall prevent the source of radiation from being put into operation.

(H) Each area shall be controlled by use of any administrative procedures and devices which are necesary to ensure that the area is cleared of personnel prior to each use of the source of radiation.

(I) Each area shall be checked by a radiation measurement to ensure that, prior to the first individual's entry into the area after any use of the source of radiation, the radiation level from the source of radiation in the area is below that at which it would be possible for an individual to receive a deep dose equivalent in excess of 1 mSv (0.1 rem) in one hour.

(J) The entry control devices required in K.A.R. 28-35-219a(d)(3) shall be tested for proper functioning.

(i) Testing shall be conducted prior to initial operation with the source of radiation on any day, unless operations were continued uninterrupted from the previous day.

(ii) Testing shall be conducted prior to resuming operation of the source of radiation after any unintentional interruption.

(iii) The licensee or registrant shall submit and adhere to a schedule for periodic tests of the entry control and warning systems.

(K) The licensee or registrant shall not conduct operations, other than those necessary to place the source of radiation in safe condition or to effect repairs on controls, unless control devices are functioning properly.

(L) Entry and exit portals that are used in transporting materials to and from the irradiation area, and that are not intended for use by individuals shall be controlled by those devices and administrative procedures which are necessary to physically protect and warn against inadvertent entry by any individual through these portals. Exit portals for irradiated materials shall be equipped to detect and signal the presence of any loose radioactive material that is carried toward such an exit and automatically to prevent loose radioactive material from being carried out of the area.

(4) Licensees, registrants, or applicants for licenses or registrations for sources of radiation within the purview of K.A.R. 28-35-219a(d)(3) which will be used in a variety of positions or in locations, such as open fields or forests, that make it impracticable to comply with certain requirements of this regulation, such as those for the automatic control of radiation levels, may apply to the department for approval of alternative safety

measures. There shall be alternative safety measures provided for personnel protection which are at least equivalent to those specified in K.A.R. 28-35-219a(d)(3). At least one of the alternative measures shall include an entry-preventing interlock control based on a measurement of the radiation that ensures the absence of high radiation levels before an individual can gain access to the area where such sources of radiation are used.

(e) Airborne radioactivity areas. Each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (or DANGER)

AIRBORNE RADIOACTIVITY AREA

(f) Additional requirements.

Each area or room in which any radioactive material is used or stored in an amount exceeding 10 times the quantity of radioactive material specified in K.A.R. 28-35-234b, appendix C of these regulations shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (or DANGER)

RADIOACTIVE MATERIAL

(g) Containers.

(1) Except as otherwise provided in this subsection, each container of radioactive material shall bear a durable, clearly visible label identifying the radioactive contents.

(2) Each label required by paragraph (g)(1) of this regulation shall bear the radiation caution symbol and the words:

CAUTION (or DANGER)

RADIOACTIVE MATERIAL

Each label shall also provide sufficient information to permit individuals handling or using the containers, or working in the vicinity of them, to take precautions to avoid or minimize exposures. As appropriate, the information may include radiation levels, kinds of material, an estimate of the activity, and the date for which activity is estimated.

(3) The labeling required under subsection (g)(1) of this regulation shall not be required:

(A) for containers that do not contain radioactive material in quantities greater than the applicable quantities listed in appendix C published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994;

(B) for containers that do not contain radioactive material in concentrations greater than the applicable concentrations listed in appendix B, table I, column 2 published in "Kansas Department of Health and Environment Appendices to Part 4: Standards for Protection Against Radiation," effective April, 1994;

(C) for containers attended by an individual who takes the precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established by these regulations;

(D) for containers in transport and packaged and labeled in accordance with 49 CFR subpart E, section 172.403 and 49 CFR, subpart I, as published by the U.S. department of transportation and as in effect on Oct. 1, 1990;

(E) for containers which are accessible only to individuals authorized to handle or use them or to work in the containers' vicinity, if the contents are identified to those individuals by a readily available written record, including containers in water-filled canals, storage vaults, hot cells or similar locations; and

(F) for manufacturing and process equipment such as piping and tanks.

(4) Before disposing of an empty uncontaminated container in unrestricted areas, each licensee shall remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive material.

(h) Each radiation machine shall be labeled in a manner which cautions individuals that radiation is produced when the machine is being operated. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-220. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-220a. **Exceptions from posting, labeling and color requirements.** (a) Notwithstanding the provisions of K.A.R. 28-35-219, posting of a caution sign shall not be required in an area or room containing radioactive material for periods of less than eight hours if:

(1) the material is constantly attended during those periods by an individual who shall take the

precautions necessary to prevent the exposure of any individual to radiation or radioactive material in excess of the limits established in K.A.R. 28-35-212a through K.A.R. 28-35-234b; and

(2) the area or room is subject to the licensee's or registrant's control.

(b) Exception to color requirements for standard radiation symbol. Notwithstanding the requirements of K.A.R. 28-35-219a, licensees or registrants shall be authorized to label sources, source holders, or device components containing sources of radiation that are subject to high temperatures, with conspicuously etched or stamped radiation caution symbols without a color requirement.

(c) Posting of a caution sign shall not be required in any room or other area in hospital that is occupied by patients, provided that:

(1) a patient being treated with a permanent implant could be released from confinement pursuant to K.A.R. 28-35-262(c)(3); or

(2) a patient being treated with a therapeutic radiopharmaceutical could be released from confinement pursuant to K.A.R. 28-35-199a(d).

(d) Posting of a caution sign shall not be required in room or area because of the presence of a sealed source, provided the radiation levels at 30 centimeters from the surface of the sealed source or housing does not exceed 0.05 mSv (0.005 rem) per hour.

(e) Posting of a caution sign shall not be required in room or area because of the presence of radiation machines used solely for diagnosis in the healing arts, dentistry, or podiatry. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-221. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-221a. **Procedures for picking up, receiving and opening packages.** (a) (1) Each licensee or registrant who expects to receive a package containing quantities of radioactive material in excess of the type A quantities specified in K.A.R. 28-35-221b:

(A) if the package is to be delivered to the licensee's or registrant's facility by the carrier, shall make arrangements to receive the package when it is offered for delivery by the carrier; or

(B) if the package is to be picked up by the licensee or registrant at the carrier's terminal, shall make arrangements to receive notification from the carrier of the arrival of the package, at the time of arrival.

(2) Each licensee or registrant who picks up a package of radioactive material from a carrier's terminal shall pick up the package expeditiously upon receipt of notification from the carrier of its arrival.

(b) (1) Each licensee or registrant, upon receipt of a package of radioactive material, shall monitor the external surfaces of each package labeled with U.S. department of transportation radioactive white I, radioactive yellow II or III labels, as specified in 49 CFR 172.403 and 172.436-440 in effect January 1, 1993, for radioactive contamination caused by leakage of the radioactive contents. Each licensee or registrant shall also monitor for radiation levels on each package containing quantities of radioactive materials that are more than or equal to the type A quantity defined in K.A.R. 28-35-221b. Each licensee or registrant shall monitor each package known to contain radioactive materials for radioactive contamination and radiation levels if there is evidence of degradation of package integrity. The monitoring shall be performed as soon as practicable after receipt, but not later than three hours after the package is received at the licensee's facility if received during the licensee's normal working hours or three hours from the beginning of the next working day if received after normal working hours. The licensee or registrant shall immediately notify the final delivery carrier and, by telephone and telegram, mailgram, or facsimile, the department when:

(A) removable radioactive surface contamination exceeds the limits of K.A.R. 28-35-221b table V of these regulations; or

(B) external radiation levels exceed the limits of K.A.R. 28-35-221b(e) and (f).

(c) Each licensee or registrant shall establish and maintain procedures for safely opening packages in which radioactive material is received and shall assure that these procedures are followed and that due consideration is given to special instructions for the type of package being opened.

(d) Licensees or registrants transferring special form sources in vehicles owned or operated by the licensee or registrant to and from a work site shall be exempt from the contamination monitoring requirements of K.A.R. 28-35-221a, but shall not

be exempt from the monitoring requirement in K.A.R. 28-35-221a for measuring radiation levels that ensures that the source is still properly lodged in its shield. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-221b. **Appendix A; determination of A_1 and A_2 and B quantities.**

(a) Single radionuclides.

(1) For a single radionuclide of known identity, the values of A_1 and A_2 shall be taken from Table I if listed there. The values A_1 and A_2 in Table I shall also be applicable for the radionuclide contained in (}, n) or (g,n) neutron sources.

(2) For any single radionuclide whose identity is known but which is not listed in Table I, the value of A_1 and A_2 shall be determined according to the following procedure:

(A) If the radionuclide emits only one type of radiation, A_1 shall be determined according to the following method. For radionuclides emitting different kinds of radiation, the value of A_1 shall be the most restrictive value of those determined for each kind of radiation. However, in either case, A_1 shall be no more than 1000 curies (37 TBq). If a parent nuclide decays into a shorter lived daughter with a half-life not greater than 10 days, A_1 shall be calculated for both the parent and the daughter, and the more limiting of the two values shall be assigned to the parent nuclide.

(i) For gamma emitters, A_1 shall be determined by the expression:

$$A_1 = \frac{9}{\Gamma} \text{ curies}$$

where Γ is the gamma-ray constant, corresponding to the dose in roentgens per curie-hour at one meter, and the number nine results from the choice of one rem per hour at a distance of three meters as the reference dose-equivalent rate.

(ii) For x-ray emitters, A_1 shall be determined by the atomic number of the nuclide:

for $Z < 55$, $A_1 = 1000$ Ci (37 TBq); and

for $Z \geq 55$, $A_1 = 200$ Ci (7.4 TBq)

where Z is the atomic number of the nuclide.

(iii) For beta emitters, A_1 shall be determined by the maximum beta energy (E_{max}) according to Table II; and

(iv) For alpha emitters, A_1 shall be determined by the expression:

$A_1 = 1000\ A_3$

where A_3 is the value listed in Table III;

(B) A_2 is the more restrictive of the following two values:

(i) The corresponding A_1; and

(ii) The value A_3 obtained from Table III.

(3) For any single radionuclide whose identity is unknown, the value of A_1 shall be taken to be 2 Ci (74 GBq) and the value of A_2 shall be taken to be 0.002 Ci (74 MBq). However, if the atomic number of the radionuclide is known to be less than 82, the value of A_1, shall be taken to be 10 Ci (370 GBq) and the value of A_2 shall be taken to be 0.4 Ci (14.8 GBq).

(b) Mixtures of radionuclides, including radioactive decay chains.

(1) For mixed fission products, the following activity limit shall be assumed if a detailed analysis of the mixture is not carried out.

$A_1 = 10$ Ci (370 GBq)

$A_2 = 0.4$ Ci (14.8 GBq)

(2) A single radioactive decay chain shall be considered to be a radionuclide when the radionuclides are present in their naturally occurring proportions and no daughter nuclide has a half-life either longer than ten days or longer than that of the parent nuclide. The activity to be taken into account and the A_1 or A_2 value from table I to be applied are those corresponding to the parent nuclide of that chain. When calculating A_1 or A_2 values, radiation emitted by daughters shall be considered. However, in the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than ten days or greater than that of the parent nuclide, the parent and daughter nuclides shall be considered to be mixtures of different nuclides.

(3) In the case of a mixture of different radionuclides, where the identity and activity of each radionuclide are known, the permissible activity of each radionuclide R_1, R_2 . . . R_n is such that $F_1 + F_2 + \ldots F_n$ is not greater than unity, where:

$$F_1 = \frac{\text{total activity of } R_1}{A_1(R_1)}$$

$$F_2 = \frac{\text{total activity of } R_2}{A_1(R_2)}$$

$$F_n = \frac{\text{total activity of } R_{2_n} \text{ and}}{A_1(R_n)}$$

A_1 (R_1, R_2 . . . R_n) is the value of A_1 or A_2 as appropriate for the nuclide R_1, R_2 . . . R_n.

(4) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the formula given in paragraph three shall be applied to establish the values of A_1 or A_2 as appropriate. All the radionuclides whose individual activities are not known (their total activity will, however, be known) shall be classed in a single group and the most restrictive value of A_1 or A_2 applicable to any one of them shall be used as the value of A_1 or A_2 in the denominator of the fraction.

(5) Where the identity of each radionuclide is known but the individual activity of none of the radionuclides is known, the most restrictive value of A_1 or A_2 applicable to any one of the radionuclides present shall be adopted as the applicable value.

(6) When the identity of none of the nuclides is known, the value of A_1 shall be taken to be 2 Ci (74 GBq) and the value of A_2 shall be taken to be 0.002 Ci (74 MBq). However, if alpha emitters are known to be absent, the value of A_2 shall be taken to be 0.4 Ci (14.8 GBq).

Table I
A_1 and A_2 Values for Radionuclides
(See Footnotes at end of Table)

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
Ac-227	Actinium (89)	1000	0.003	7.2 2 10^1
Ac-228		10	4	2.2 2 10^6
Aq-105	Silver (47)	40	40	3.1 2 10^4
Aq-110m		7	7	4.7 2 10^3
Am-241	Americium (95)	8	0.008	3.2
Am-243		8	0.008	1.9 2 $10^{2\,1}$
Ar-37 (compressed or uncompressed)*	Argon (18)	1000	1000	1.0 2 10^5
Ar-41 (uncompressed)*		20	20	4.3 2 10^7
Ar-41 (compressed)*		1	1	4.3 2 10^7
As-73	Arsenic (33)	1000	400	2.4 2 10^4
As-74		20	20	1.0 2 $10^{2\,5}$
As-76		10	10	1.6 2 10^6
As-77		300	20	1.1 2 10^6
At-211	Astatine (85)	200	7	2.1 2 10^6
Au-193	Gold (79)	200	200	9.3 2 10^5
Au-196		30	30	1.2 2 10^5
Au-198		40	20	2.5 2 10^5
AU-199		200	25	2.1 2 10^5
Ba-131	Barium (56)	40	40	8.7 2 10^4
Ba-133		40	40	4.0 2 10^2
Ba-140		20	20	7.3 2 10^4
Be-7	Beryllium (4)	300	300	3.5 2 10^5
Bi-206	Bismuth (83)	5	5	9.9 2 10^4
Bi-207		10	10	2.2 2 10^2
Bi-210 (RaE)		100	4	1.2 2 10^5
Bi-212		6	6	1.5 2 10^7
Bk-249	Berkelium (97)	1000	1	1.8 2 10^3
Br-77	Bromine (35)	70	25	7.1 2 10^5
Br-82		6	6	1.1 2 10^6
C-11	Carbon (6)	20	20	8.4 2 10^8
C-14		1000	60	4.6
Ca-45	Calcium (20)	1000	25	1.9 2 10^4
Ca-47		20	20	5.9 2 10^5
Cd-109	Cadmium (48)	1000	70	2.6 2 10^3
Cd-115m		30	30	2.6 2 10^4
Cd-115		80	20	5.1 2 10^5
Ce-139	Cerium (58)	100	100	6.5 2 10^3
Ce-141		300	25	2.8 2 10^4

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
Ce-143		60	20	6.6 2 10^5
Ce-144		10	7	3.2 2 10^3
Cf-249	California (98)	2	0.002	3.1
Cf-250		7	0.007	1.3 2 10^2
Cf-252		2	0.009	6.5 2 10^2
Cl-36	Chlorine (17)	300	10	3.2 2 $10^{2\,2}$
Cl-38		10	10	1.3 2 10^8
Cm-242	Curium (96)	200	0.2	3.3 2 10^3
Cm-243		9	0.009	4.2 2 10^1
Cm-244		10	0.01	8.2 2 10^1
Cm-245		6	0.006	1.0 2 $10^{2\,1}$
Cm-246		6	0.006	3.6 2 $10^{2\,1}$
Co-56	Cobalt (27)	5	5	3.0 2 10^4
Co-57		90	90	8.5 2 10^3
Co-58m		1000	1000	5.9 2 10^6
Co-58		20	20	3.1 2 10^4
Co-60		7	7	1.1 2 10^3
Cr-51	Chromium (24)	600	600	9.2 2 10^4
Cs-129	Cesium (55)	40	40	7.6 2 10^5
Cs-131		1000	1000	1.0 2 10^5
Cs-134m		1000	10	7.4 2 10^6
Cs-134		10	10	1.2 2 10^3
Cs-135		1000	25	8.8 2 $10^{2\,4}$
Cs-136		7	7	7.4 2 10^4
Cs-137		30	2810	9.8 2 10^1
Cu-64	Copper (29)	80	25	3.8 2 10^6
Cu-67		200	25	7.9 2 10^5
Dy-165	Dysprosium (66)	100	20	8.2 2 10^6
Dy-166		1000	200	2.3 2 10^5
Er-169	Erbium (68)	1000	25	8.2 2 10^4
Er-171		50	20	2.4 2 10^6
Eu-152m	Europium (63)	30	30	2.2 2 10^6
Eu-152		20	10	1.9 2 10^2
Eu-154		10	5	1.5 2 10^2
Eu-155		400	60	1.4 2 10^3
F-18	Fluorine (9)	20	20	9.3 2 10^7
Fe-52	Iron (26)	5	5	7.3 2 10^6
Fe-55		1000	1000	2.2 2 10^3
Fe-59		10	10	4.9 2 10^4
Ga-67	Gallium (31)	100	100	6.0 2 10^5
Ga-68		10	20	4.0 2 10^7
Ga-72		7	7	3.1 2 10^6
Gd-153	Gadolinium (64)	200	100	3.6 2 10^3
Gd-159		300	20	1.1 2 10^6
Ge-68	Germanium (32)	20	10	7.0 2 10^3
Ge-71		1000	1000	1.6 2 10^5
H-3	Hydrogen (1) see T-Tritium			
Hf-181	Hafnium (72)	30	25	1.6 2 10^4
Hg-197m	Mercury (80)	200	200	6.6 2 10^5
Hg-197		200	200	2.5 2 10^5
Hg-203		80	25	1.4 2 10^4
Ho-166	Holmium (67)	30	30	6.9 2 10^5
I-123	Iodine (53)	50	50	1.9 2 10^6
I-125		1000	70	1.7 2 10^4
I-126		40	10	7.8 2 10^4

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
I-129		1000	2	1.6 2 $10^{2\,4}$
I-131		40	10	1.2 2 10^{5}
I-132		7	7	1.1 2 10^{7}
I-133		30	10	1.1 2 10^{6}
I-134		8	8	2.7 2 10^{7}
I-135		10	10	3.5 2 10^{6}
In-111	Indium (49)	30	25	4.2 2 10^{5}
In-113m		60	60	1.6 2 10^{7}
In-114m		30	20	2.3 2 10^{4}
In-115m		100	20	6.1 2 10^{6}
Ir-190	Iridium (77)	10	10	6.2 2 10^{4}
Ir-192		20	10	9.1 2 10^{3}
Ir-194		10	10	8.5 2 10^{5}
K-42	Potassium (19)	10	10	6.0 2 10^{6}
K-43		20	10	3.3 2 10^{6}
Kr-85m (uncompressed)*	Krypton (36)	100	100	8.4 2 10^{6}
Kr-85m (compressed)*		3	3	8.4 2 10^{6}
Kr-85 (uncompressed)*		1000	1000	4.0 2 10^{2}
Kr-85 (compressed)*		5	5	4.0 2 10^{2}
Kr-87 (uncompressed)*		20	20	2.8 2 10^{7}
Kr-87 (compressed)*		0.6	0.6	2.8 2 10^{7}
La-140	Lanthanum (57)	30	30	5.6 2 10^{5}
Lu-177	Lutetium (71)	300	25	1.1 2 10^{5}
MFP	Mixed Fission products	10	0.4	---
Mg-28	Magnesium (12)	6	6	5.2 2 10^{6}
Mn-52	Manganese (25)	5	5	4.4 2 10^{5}
Mn-54		20	20	8.3 2 10^{3}
Mn-56		5	5	2.2 2 10^{7}
Mo-99	Molybdenum (42)	100	20	4.7 2 10^{5}
N-13	Nitrogen (7)	20	10	1.5 2 10^{9}
Na-22	Sodium (11)	8	8	6.3 2 10^{3}
Na-24		5	5	8.7 2 10^{6}
Nb-93m	Niobium (41)	1000	200	1.1 2 10^{3}
Nb-95		20	20	3.9 2 10^{4}
Nb-97		20	20	2.6 2 10^{7}
Nd-147	Neodymium (60)	100	20	8.0 2 10^{4}
Nd-149		30	20	1.1 2 10^{7}
Ni-59	Nickel (28)	1000	900	8.1 2 $10^{2\,2}$
Ni-63		1000	100	4.6 2 10^{1}
Ni-65		10	10	1.9 2 10^{7}
Np-237	Neptunium (93)	5	0.005	6.9 2 $10^{2\,4}$
Np-239		200	25	2.3 2 10^{5}
Os-185	Osmium (76)	20	20	7.3 2 10^{3}
Os-191		600	200	4.6 2 10^{4}
Os-191m		200	200	1.2 2 10^{6}
Os-193		100	20	5.3 2 10^{5}
P-32	Phosphorus (15)	30	30	2.9 2 10^{5}
Pa-230	Protactinium (91)	20	0.8	3.2 2 10^{4}
Pa-231		2	0.002	4.5 2 $10^{2\,2}$
Pa-233		100	100	2.1 2 10^{4}
Pb-201	Lead (82)	20	20	1.7 2 10^{6}
Pb-210		100	0.2	8.8 2 10^{1}
Pb-212		6	5	1.4 2 10^{6}
Pd-103	Palladium (46)	1000	700	7.5 2 10^{4}
Pd-109		100	20	2.1 2 10^{6}

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
Pm-147	Promethium (61)	1000	25	9.4 2 10^2
Pm-149		10	20	4.2 2 10^5
Po-210	Polonium (84)	200	0.2	4.5 2 10^3
Pr-142	Praseodymium (59)	10	10	1.2 2 10^4
Pr-143		300	20	6.6 2 10^4
Pt-191	Platinum (78)	100	100	2.3 2 10^5
Pt-193m		200	200	2.0 2 10^5
Pt-197m		300	20	1.2 2 10^7
Pt-197		300	20	8.8 2 10^5
Pu-238	Plutonium (94)	3	0.003	1.7 2 10^1
Pu-239		2	0.002	6.2 2 $10^{2\,2}$
Pu-240		2	0.002	2.3 2 $10^{2\,1}$
Pu-241		1000	0.1	1.1 2 10^2
Pu-242		3	0.003	3.9 2 $10^{2\,3}$
Ra-223	Radium (88)	50	0.2	5.0 2 10^4
Ra-224		6	0.5	1.6 2 10^5
Ra-226		10	0.05	1.0
Ra-228		10	0.05	2.3 2 10^2
Rb-81	Rubidium (37)	30	24	8.2 2 10^6
Rb-86		30	30	8.1 2 10^4
Rb-87		Unlimited	Unlimited	6.6 2 $10^{2\,8}$
Rb (natural)		Unlimited	Unlimited	1.8 2 $10^{2\,8}$
Re-186	Rhenium (75)	100	20	1.9 2 10^5
Re-187		Unlimited	Unlimited	3.8 2 $10^{2\,8}$
Re-188		10	10	1.0 2 10^6
Re (natural)		Unlimited	Unlimited	2.4 2 $10^{2\,8}$
Rh-103m	Rhodium (45)	1000	1000	3.2 2 10^7
Rh-105		200	25	8.2 2 10^5
Rn-222	Radon (86)	10	2	1.5 2 10^5
Ru-97	Ruthenium (44)	80	80	5.5 2 10^5
Ru-103		30	25	3.2 2 10^4
Ru-105		20	20	6.6 2 10^6
Ru-106		10	7	3.4 2 10^3
S-35	Sulphur (16)	1000	60	4.3 2 10^4
Sb-122	Antimony (51)	30	30	3.9 2 10^5
Sb-124		5	5	1.8 2 10^4
Sb-125		40	25	1.4 2 10^3
Sc-46	Scandium (21)	8	8	3.4 2 10^4
Sc-47		200	20	8.2 2 10^5
Sc-48		5	5	1.5 2 10^6
Se-75	Selenium (34)	40	40	1.4 2 10^4
Si-31	Silicon (14)	100	20	3.9 2 10^7
Sm-147	Samarium (62)	Unlimited	Unlimited	2.0 2 $10^{2\,8}$
Sm-151		1000	90	2.6 2 10^1
Sm-153		300	20	4.4 2 10^5
Sn-113	Tin (50)	60	60	1.0 2 10^4
Sn-119m		100	100	4.4 2 10^3
Sn-125		10	10	1.1 2 10
Sr-85m	Strontium (38)	80	80	3.2 2 10^7
Sr-85		30	30	2.4 2 10^4
Sr-85m		50	50	1.2 2 10^7
Sr-89		100	10	2.9 2 10^4
Sr-90		10	0.4	1.5 2 10^2
Sr-91		10	10	3.6 2 10^6

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
Sr-92		10	10	1.3 2 10^7
T (uncompressed)*	Tritium (1)	1000	1000	9.7 2 10^3
T (compressed)*		1000	1000	9.7 2 10^3
T (activated luminous paint)		1000	1000	9.7 2 10^3
T (absorbed on solid carrier)		1000	1000	9.7 2 10^3
T (tritiated water)		1000	1000	9.7 2 10^3
T (other forms)		20	20	9.7 2 10^3
Ta-182	Tantalum (73)	20	20	6.2 2 10^3
Tb-160	Terbium (65)	20	10	1.1 2 10^4
Tc-96m	Technetium (43)	1000	1000	3.8 2 10^7
Tc-96		6	6	3.2 2 10^5
Tc-97m		1000	200	1.5 2 10^4
Tc-97		1000	400	1.4 2 10^{23}
Tc-99m		100	100	5.2 2 10^6
Tc-99		1000	25	1.7 2 10^{-2}
Te-125m	Tellurium (52)	1000	100	1.8 2 10^4
Te-127m		300	20	4.0 2 10^4
Te-127		300	20	2.6 2 10^6
Te-129m		30	10	2.5 2 10^4
Te-129		100	20	2.0 2 10^7
Te-131m		10	10	8.0 2 10^5
Te-132		7	7	3.1 2 10^5
Th-227	Thorium (90)	200	0.2	3.2 2 10^4
Th-228		6	0.008	8.3 2 10^2
Th-230		3	0.003	1.9 2 10^{22}
Th-231		1000	25	5.3 2 10^5
Th-232		Unlimited	Unlimited	1.1 2 10^{27}
Th-234		10	10	2.3 2 10^4
Th (natural)		Unlimited	Unlimited	2.2 2 10^{27}
Th (irradiated)**		---	---	---
Tl-200	Thallium (81)	20	20	5.8 2 10^5
Tl-201		200	200	2.2 2 10^5
Tl-202		40	40	5.4 2 10^4
Tl-204		300	10	4.3 2 10^2
Tm-170	Thulium (69)	300	10	6.0 2 10^3
Tm-171		1000	100	1.1 2 10^3
U-230	Uranium (92)	100	0.1	2.7 2 10^4
U-232		30	0.03	2.1 2 10^1
U-233		100	0.1	9.5 2 10^{23}
U-234		100	0.1	6.2 2 10^{23}
U-235		100	0.2	2.1 2 10^{26}
U-236		200	0.2	6.3 2 10^{25}
U-238		Unlimited	Unlimited	3.3 2 10^{27}
U-(natural)		Unlimited	Unlimited	see Table IV
U-(enriched) , 20%		Unlimited	Unlimited	see Table IV
20% or greater		100	0.1	see Table IV
U-(depleted)		Unlimited	Unlimited	see Table IV
U (irradiated)***		---	---	---
V-48	Vanadium (23)	6	6	1.7 2 10^5
W-181	Tungsten (74)	200	100	5.0 2 10^3
W-185		1000	25	9.7 2 10^{23}

Symbol of radionuclide	Element and atomic number	A_1(Ci)	A_2(Ci)	Specific Activity (Ci/g)
W-187		40	20	7.0 2 10^5
Xe-127 (uncompressed)*	Xenon (54)	70	70	2.8 2 10^4
Xe-127 (compressed)*		5	5	2.8 2 10^4
Xe-131m (compressed)*		10	10	1.0 2 10^5
Xe-131m (uncompressed)*		100	100	1.0 2 10^5
Xe-133 (uncompressed)*		1000	1000	1.9 2 10^5
Xe-133 (compressed)*		5	5	1.9 2 10^5
Xe-135 (uncompressed)*		70	70	2.5 2 10^5
Xe-135 (compressed)*		2	2	2.5 2 10^5
Y-87	Yttrium (39)	20	20	4.5 2 10^1
Y-90		10	10	2.5 2 10^5
Y-91m		30	30	4.1 2 10^7
Y-91		30	30	2.5 2 10^4
Y-92		10	10	9.5 2 10^6
Y-93		10	10	3.2 2 10^6
Yb-169	Ytterbium (70)	80	80	2.3 2 10^5
Yb-175		400	25	1.8 2 10^5
Zn-65	Zinc (30)	30	30	8.0 2 10^3
Zn-69m		40	20	3.3 2 10^6
Zn-69		300	20	5.3 2 10^7
Zr-93	Zirconium (40)	1000	200	3.5 2 $10^{2\,3}$
Zr-95		20	20	2.1 2 10^4
Zr-97		20	20	2.0 2 10^6

*For the purpose of Table I, compressed gas means a gas at a pressure which exceeds the ambient atmospheric pressure at the location where the containment system was closed.

**The values of A_1 and A_2 must be calculated in accordance with the procedure specified in Appendix A, paragraph II 3, taking into account the activity of the fission products and of the uranium-233 in addition to that of the thorium.

***The values of A_1 and A_2 must be calculated in accordance with the procedure specified in Appendix A, paragraph II 3, taking into account the activity of the fission products and plutonium isotopes in addition to that of the uranium.

Table II
Relationship Between A_1 and E_{max} for the Beta Emitters

E_{max} (MeV)	A_1(Ci)
, 0.5	1000
0.5 - , 1.0	300
1.0 - , 1.5	100
1.5 - , 2.0	30
> 2.0	10

Table III
Relationship Between A_1 and the Atomic Number of the Radionuclide

Atomic Number	A_3 Half-life less than 1000 days	Half-life 1000 days to 10^6 years	Half-life greater than 10^6 years
1 to 81	3 Ci	0.05 Ci	3 Ci
82 and above	0.002 Ci	0.002 Ci	3 Ci

Table IV
Activity-Mass Relationships for Uranium/Thorium

Thorium and Uranium Enrichment* wt % U-235 present	Specific Activity Ci/g	Specific Activity g/Ci
0.45	5.0×10^{-7}	2.0×10^{6}
0.72 (natural)	7.062×10^{-7}	1.422×10^{6}
1.0	7.6×10^{-7}	1.3×10^{6}
1.5	1.0×10^{-6}	1.0×10^{6}
5.0	2.7×10^{-6}	3.7×10^{5}
10.0	4.8×10^{-6}	2.1×10^{5}
20.0	1.0×10^{-5}	1.0×10^{5}
35.0	2.0×10^{-5}	5.0×10^{4}
50.0	2.5×10^{-5}	4.0×10^{4}
90.0	5.8×10^{-5}	1.7×10^{4}
93.0	7.0×10^{-5}	1.4×10^{4}
95.0	9.1×10^{-5}	1.1×10^{4}
Natural Thorium	2.2×10^{-7}	4.6×10^{6}

* The figures for uranium include representative values for the activity of the uranium-234 which is concentrated during the enrichment process. The activity for thorium includes the equilibrium concentration of thorium-228.

(c) Type B quantity shall mean a quantity of radioactive materials greater than a type A quantity.

(d) The level of removable contamination on the external surfaces of each package shall, when averaged over the surface wiped, not exceed the limits given in table V below at any time during transport. The level of removable radioactive contamination shall be determined by wiping an area of 300 square centimeters of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements shall be taken in the most appropriate locations to yield a representative assessment of the removable contamination levels. Only in the case of packages transported as exclusive use shipment by rail or highway, may the removable radioactive contamination exceed the levels prescribed in table V. In this case, the levels shall not exceed 10 times the levels prescribed in table V.

Table V
Removable External Radioactive Contamination Wipe Limits

Contaminant	Maximum Permissible Limits uCi/cm²	Maximum Permissible Limits dpm/cm²
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium; uranium-235; uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates	10^{-5}	22
All other alpha emitting radionuclides	10^{-6}	2.2

(e) External radiation levels around the package and around the vehicle, if applicable, shall not exceed 200 millirems per hour (2 mSv/hr) at any point on the external surface of the package at any time during transportation. The transport index shall not exceed 10.

(f) For a package transported in exclusive use by rail, highway or water, radiation levels external to the package may exceed the limits specified in K.A.R. 28-35-221b(d) but shall not exceed any of the following:

(1) 200 millirems per hour (2 mSv/hr) on the accessible external surface of the package unless the following conditions are met, in which case the limit shall be 1000 millirem per hour (10 mSv/hr):

(A) The shipment is made in a closed transport vehicle;

(B) provisions are made to secure the package so that its position within the vehicle remains fixed during transportation; and

(C) there are no loading or unloading operations between the beginning and end of the transportation;

(2) 200 millirems per hour (2 mSv/hr) at any point on the outer surface of the vehicle, including the upper and lower surfaces, or, in the case of a flat-bed style vehicle, with a personnel barrier, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle;

(3) 10 millirems per hour (0.1 mSv/hr) at any point 2 meters from the vertical planes represented by the outer lateral surfaces of the vehicle, or, in the case of a flat-bed style vehicle, at any point 2 meters from the vertical planes projected from the outer edges of the vehicle; and

(4) 2 millirems per hour (0.02 mSv/hr) in any normally occupied positions of the vehicle, except that this provision shall not apply to private motor carriers when persons occupying these positions are provided with special health supervision personnel radiation exposure monitoring devices, and training in accordance with K.A.R. 28-35-333. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-222. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-222a. **Storage and control of sources of radiation.** (a) Each licensee or registrant shall secure from unauthorized removal or access licensed or registered sources of radiation that are stored in controlled or unrestricted areas.

(b) Each licensee or registrant shall control and maintain constant surveillance of licensed or registered radioactive material that is in a controlled or unrestricted area and that is not in storage or in a patient.

(c) Each registrant shall maintain control of radiation machines that are in a controlled or unrestricted area and that are not in storage. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-223. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-223a. **Waste disposal; general requirements.** (a) A licensee shall not dispose of any radioactive material except:

(1) to transfer the material to an authorized recipient as provided in K.A.R. 28-35-190; or

(2) pursuant to K.A.R. 28-35-214b, 28-35-223a(c)(1), or 28-35-224a; or

(3) by decay in storage.

(b) A person shall be specifically licensed or registered to receive waste containing licensed or registered material from other persons for:

(1) treatment prior to disposal;

(2) treatment or disposal by incineration;

(3) decay in storage;

(4) disposal at a land disposal facility licensed pursuant to these regulations; or

(5) storage until transferred to a storage or disposal facility authorized to receive the waste.

(c) (1) Any person may apply to the department for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in this part. Each applicant shall include a description of the radioactive material, including:

(A) the quantities and kinds of radioactive material;

(B) the levels of radioactivity involved; and

(C) the proposed manner and conditions of disposal.

(2) The application, when appropriate, shall also include an analysis and evaluation of pertinent information concerning:

(A) the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics;

(B) usage of ground and surface waters in the general area;

(C) the nature and location of other potentially affected facilities; and

(D) procedures to be observed to minimize the risk of unexpected or hazardous exposures.

(3) An application for a license to receive radioactive material from other persons for disposal on land not owned by a state or the federal government shall not be approved by the department.

(d) (1) Any licensee may dispose of the following licensed material without regard to its radioactivity:

(A) 0.05 microcuries (1.850 kBq) or less of hydrogen-3 or carbon-14 per gram of medium used for liquid scintillation counting; and

(B) 0.05 microcuries or less of hydrogen-3 or carbon-14, per gram of animal tissue averaged over the weight of the entire animal. Tissue shall not be disposed of under this section in a manner that would permit its use either as food for humans or as animal feed.

(2) This regulation shall not relieve any licensee or registrant of the duty to maintain records showing the receipt, transfer and disposal of such radioactive material as specified in K.A.R. 28-35-227a.

(3) This regulation shall not relieve any licensee or registrant of the duty to comply with other applicable federal, state and local regulations governing any other toxic or hazardous property of these materials. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-223b. **Waste classification.** (a) Classification of waste for near surface disposal. In classifying radiation waste, consideration shall be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. Consideration shall also be given to the concentration of short-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are efficient.

(b) Classes of waste.

(1) ''Class A waste'' is waste that is segregated from other waste classes at the disposal site. The physical form and characteristics of class A waste shall meet the minimum requirements set forth in K.A.R 28-35-223c(a). If class A waste also meets the stability requirements set forth in K.A.R. 28-35-223c(b), the requirement that such wastes be separated shall be waived.

(2) ''Class B waste'' is waste that must meet more rigorous requirements as to waste form to insure stability after disposal. The physical form and characteristics of class B waste shall meet both the minimum and stability requirements set forth in K.A.R. 28-35-223c.

(3) ''Class C waste'' is waste that must meet more rigorous requirements as to waste form to insure stability and that also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of class C waste shall meet both the minimum and stability requirements set forth in K.S.A. 28-35-223c.

(4) ''Waste that is not generally acceptable for near-surface disposal'' is waste for which waste form and disposal methods must be different, and in general more stringent, than those specified for class C wastes. In the absence of specific requirements in this part, proposals for disposal of this waste may be submitted to the department for approval.

(c) Classification determined by long-lived radionuclides. If radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

(1) If the concentration does not exceed 0.1 times the value in Table 1, the waste shall be assigned to Class A.

(2) If the concentration exceeds 0.1 times the value in Table 1, the waste shall be assigned to Class C.

(3) If the concentration exceeds the value in Table 1, the waste shall not be generally acceptable for near-surface disposal.

(4) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in subsection (g) of this regulation.

(d) Classification determined by short-lived radionuclides.

(1) If the radionuclides are not listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. If a radionuclide is not listed in Table 2, it shall not be considered in determining waste classification.

(2) If the concentration does not exceed the value in Column 1 of Table 2, the waste shall be assigned to Class A.

(3) If the concentration exceeds the value in Column 1, Table 2, but does not exceed the value in Column 2, Table 2, the waste shall be assigned to Class B.

Table 1

Radionuclide	Concentration Curies/Cubic Meter
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3

Radionuclide	Concentration Curies/Cubic Meter
Alpha emitting transuranic nuclides with half-life greater than 5 years	100*
Pu-241	3,500*
Cm-242	20,000

* Units are nanocuries per gram

Table 2

Radionuclide	Concentration, Curies/Cubic Meter Column 1	Column 2	Column 3
Total of all nuclides with less than 5 year half-life	700	**	**
H-3	40	**	**
Co-60	700	**	**
Ni-63	3.5	70	700
Ni-63 inactivated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

** There are no limits established for these radionuclides in Class B or Class C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentration of other nuclides in Table 2 independently determine the waste to be Class C.

(4) If the concentration exceeds the value in Column 2, Table 2, but does not exceed the value in Column 3, Table 2, the waste shall be assigned to Class C.

(5) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.

(6) For wastes containing mixtures of the nuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule described in subsection (g) of this regulation.

(e) Classification determined by both long- and short-lived radionuclides. If radioactive wastes contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:

(1) If the concentration of a nuclide listed in Table 1 is less than 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of nuclides listed in Table 2.

(2) If the concentration of a nuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1, the waste shall be Class C, if the concentration of nuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

(f) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it shall be assigned to Class A.

(g) The sum of the fractions rule for mixtures of radionuclides. For determining the classification of waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each nuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits shall all be taken from the same column of the same table. The sum of the fractions for the column shall be less than 1.0 if the waste class is to be determined by that column.

(h) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods. Such methods may include use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-223c. **Waste characteristics.** (a) The following requirements shall be the minimum requirements for all classes of waste:

(1) Radioactive wastes shall be packaged in conformance with the conditions of the license issued to the site operator to which the waste will be shipped. If the conditions of the site license are more restrictive than the provisions of these regulations, the site license conditions shall govern.

(2) Wastes shall not be packaged for disposal in cardboard or fiberboard boxes.

(3) Liquid waste shall be packaged in sufficient absorbent material to absorb twice the volume of the liquid.

(4) Solid wastes containing liquid shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.

(5) Waste shall not be readily capable of detonation or of explosive decomposition or reaction at normal temperatures and pressures, or of explosive reaction with water.

(6) Waste shall not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This requirement shall not apply to radioactive gaseous waste packaged in accordance with paragraph (8) of this subsection.

(7) Waste shall not be pyrophoric. Pyrophoric materials contained in wastes shall be treated, prepared, and packaged to be nonflammable.

(8) Wastes in a gaseous form shall be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Total activity shall not exceed 100 curies per container.

(9) Wastes containing hazardous, biological, pathogenic, or infectious material shall be treated to reduce, to the maximum extent practicable, the potential hazard from the non-radiological materials.

(b) The requirements in this section are intended to provide stability of the waste:

(1) Waste shall have structural stability. A structurally stable waste form shall maintain its physical dimensions and its form, under the expected disposal conditions. Such proposed conditions may include weight of overburden and compaction equipment, the presence of moisture, and microbal activity, and internal factors, including radiation effects and chemical changes. Structural stability may be provided by the waste form itself, by processing the waste to a stable form, or by placing the waste in a disposal container or structure that provides stability after disposal.

(2) Notwithstanding the provisions of K.A.R. 28-35-223c(a)(2) and (3), liquid wastes, or wastes containing liquid, shall be converted into a form that contains as little free-standing and noncorrosive liquid as reasonably achievable. In no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form.

(3) Void spaces within the waste and between the waste and its package shall be reduced to the extent practicable. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-223d. **Labeling.** Each package of waste must be clearly labeled to identify whether it is Class A waste, Class B waste, or Class C waste, in accordance with K.A.R 28-35-223b. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986.)

28-35-224. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-224a. **Disposal by release into sanitary sewage systems.** (a) A licensee shall not discharge radioactive material into a sanitary sewage system unless the following requirements are met:

(1) it is readily soluble or it is readily dispersible biological material, in water; and

(2) the quantity of any radioactive material released into the system by the licensee in any month shall not exceed the quantity which, if diluted by the average monthly quantity of sewage released into the sewer by the licensee, would result in an average concentration no greater than the limits specified in K.A.R. 28-35-233b, table III.

(3) If more than one radionuclide is released, the following additional conditions shall be satisfied.

(A) The licensee or registrant shall determine the fraction of the limit in table III of K.A.R. 28-35-233b appendix B represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee or registrant into the sewer by the concentration of that radionuclide listed in table III of K.A.R. 28-35-233b appendix B.

(B) The sum of the fractions for each radionuclide required by K.A.R. 28-35-224a(a)(3)(A) shall not exceed unity.

(4) The gross quantity of radioactive material, excluding hydrogen-3 and carbon-14, released into the sewage system by the licensee shall not exceed one curie (37 GBq) per year. The quantities of hydrogen-3 and carbon-14 released into the sanitary sewage system shall not exceed five curies (185 GBq) per year for hydrogen-3 and one curie (37 GBq) per year for carbon-14.

(b) A licensee shall not discharge radioactive material into an individual sewage disposal system used for the treatment of waste water serving only a single dwelling, office building, industrial plant, or institution except as specifically approved by the department pursuant to K.A.R. 28-35-214a and 28-35-223a(c).

(c) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this regulation. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-225. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-225a. **Disposal by burial in soil.** A licensee shall not dispose of radioactive material by burial in soil except as specifically approved by the department pursuant to K.A.R. 28-35-223a (c). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-226. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-226a. **Disposal by incineration.** A licensee shall not incinerate radioactive material for the purpose of disposal or preparation for disposal, except as specifically approved by the department pursuant to K.A.R. 28-35-223a(c). (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-227. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-227a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; revoked Oct. 17, 1994.)

28-35-227b. **General provisions.** (a) Each licensee or registrant shall use the SI units becquerel, gray, sievert and coulomb per kilogram, or the special unit curie, rad, rem, and roentgen, including multiples and subdivisions, and shall clearly indicate the units of all quantities on records required by these regulations.

(b) Each licensee or registrant shall make a clear distinction among the quantities entered on the records required by these regulations, including total effective dose equivalent, total organ dose equivalent, shallow dose equivalent, eye dose equivalent, deep dose equivalent, or committed effective dose equivalent. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227c. **Records of radiation protection programs.** (a) Each licensee or registrant shall maintain records of the radiation protection program, including:

(1) the provisions of the program; and

(2) audits and other reviews of program content and implementation.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227c(a)(1) until the department terminates each pertinent license or registration requiring the record. The licensee or registrant shall retain the records required by K.A.R. 28-35-227c(a)(2) for three years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227d. **Records of surveys.** (a) Each licensee or registrant shall maintain records showing the results of surveys and calibrations required by K.A.R. 28-35-217a and K.A.R. 28-35-221a(b). The licensee or registrant shall retain these records for three years after the record is made.

(b) The licensee or registrant shall retain each of the following records until the department terminates each pertinent license or registration requiring the record:

(1) records of the results of surveys to determine the dose from external sources of radiation used, in the absence of or in combination with individual monitoring data, in the assessment of individual dose equivalents;

(2) records of the results of measurements and calculations used to determine individual intakes of radioactive material and used in the assessment of internal dose;

(3) records showing the results of air sampling, surveys, and bioassays required pursuant to K.A.R. 28-35-212g(c)(1)(C)(i) and (ii); and

(4) records of the results of measurements and calculations used to evaluate the release of radioactive effluents to the environment.

(c) Upon termination of the license or registration, the licensee or registrant shall permanently store records on a form approved by the department or an equivalent form, or shall make arrangements with the department for transfer of the records to the department. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607, effective Oct. 17, 1994.)

28-35-227e. **Records of tests for leakage or contamination of sealed sources.** A record of each test for leakage or contamination of sealed sources shall be kept in units of becquerel or microcurie and maintained for inspection by the department for five years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227f. **Records of prior occupational dose.** (a) The licensee or registrant shall retain the records of prior occupational dose and exposure history as specified in K.A.R. 28-35-212e on a form approved by the department, or an equivalent form, until the department terminates each pertinent license requiring this record. The licensee or registrant shall retain records used in preparing this form for three years after the record is made.

(b) Upon termination of the license or registration, the licensee or registrant shall permanently store records on the department approved form or equivalent, or shall make arrangements with the department for transfer of the records to the department. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227g. **Records of planned special exposures.** (a) For each use of the provisions of K.A.R. 28-35-212f for planned special exposures, the licensee or registrant shall maintain records that describe:

(1) the exceptional circumstances requiring the use of a planned special exposure;

(2) the name of the management official who authorized the planned special exposure and a copy of the signed authorization;

(3) what actions were necessary;

(4) why the actions were necessary;

(5) what precautions were taken to assure that doses were maintained ALARA;

(6) what individual and collective doses were expected to result; and

(7) the doses actually received in the planned special exposure.

(b) The licensee or registrant shall retain the records of a planned special exposure until the department terminates each pertinent license or registration requiring these records.

(c) Upon termination of the license or registration, the licensee or registrant shall permanently store records on the department approved form or equivalent, or shall make arrangements with the department for transfer of the records to the department. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227h. **Records of individual monitoring results.** (a) Each licensee or registrant shall maintain records of doses received by all individuals for whom monitoring was required pursuant to K.A.R. 28-35-217b, and records of doses received during planned special exposures, accidents, and emergency conditions. Assessments of dose equivalent and records made using units in effect before January 1, 1994 need not be changed. These records shall include, when applicable:

(1) the deep dose equivalent to the whole body, eye dose equivalent, shallow dose equivalent to the skin, and shallow dose equivalent to the extremities;

(2) the estimated intake of radionuclides;

(3) the committed effective dose equivalent assigned to the intake of radionuclides;

(4) the specific information used to calculate the committed effective dose equivalent pursuant to K.A.R. 28-35-212d(c);

(5) the total effective dose equivalent when required by K.A.R. 28-35-212b; and

(6) the total of the deep dose equivalent and the committed dose to the organ receiving the highest total dose.

(b) The licensee or registrant shall make entries of the records specified in K.A.R. 28-35-227h(a) at intervals not to exceed one year.

(c) The licensee or registrant shall maintain the records specified in K.A.R. 28-35-227h(a) on a form approved by the department, in accordance with the instructions from the department, or in clear and legible records containing all the information required by the department-approved form.

(d) The licensee or registrant shall maintain the records of dose to an embryo/fetus with the records of dose to the declared pregnant woman. The declaration of pregnancy, including the estimated date of conception, shall also be kept on file, but may be maintained separately from the dose records.

(e) The licensee or registrant shall retain each required form or record until the department terminates each pertinent license or registration requiring the record.

(f) Upon termination of the license or registration, the licensee or registrant shall permanently store records on a form approved by the department or equivalent, or shall make arrangements with the department for transfer of the records to the department. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227i. **Records of dose to individual members of the public.** (a) Each licensee or registrant shall maintain records sufficient to demonstrate compliance with the dose limit for individual members of the public.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227i(a) until the department terminates each pertinent license or registration requiring the record. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227j. **Records of waste disposal.** (a) Each licensee or registrant shall maintain records of the disposal of licensed or registered materials made pursuant to K.A.R. 28-35-223a(c) and (d), 28-35-224a, 28-35-225a or 28-35-226a, and disposal by burial in soil, including burials authorized by these regulations before May 1, 1986.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227j(a) until the department terminates each pertinent license or registration requiring the record. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227k. **Records of testing entry control devices for very high radiation areas.** (a) Each licensee or registrant shall maintain records of tests made pursuant to K.A.R. 28-35-219a(d)(3)(J) on entry control devices for very high radiation areas. These records shall include the date, time, and results of each test of function.

(b) The licensee or registrant shall retain the records required by K.A.R. 28-35-227k(a) for three years after the record is made. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-227l. **Form of records.** (a) Each record required by these regulations shall be legible throughout the specified retention period.

(1) The record shall be the original or a reproduced copy or a microform, provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period.

(2) The record may be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period.

(b) Records, including documents, letters, drawings, and specifications, shall include all pertinent information, including any stamps, initials, and signatures.

(c) The licensee shall maintain adequate safeguards against tampering with and loss of records. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-228. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-228a. **Reports of theft or loss of sources of radiation.** (a) Each licensee or registrant shall report by telephone, telegraph or facsimile to the department the theft or loss of the following sources of radiation immediately after such occurrence becomes known to the licensee or registrant:

(1) stolen, lost, or missing licensed or registered radioactive material in an aggregate quantity equal to or greater than 1,000 times the quantity specified in K.A.R. 28-35-234b appendix C if it appears to the licensee or registrant that an exposure could result to individuals in unrestricted areas; or

(2) a stolen, lost, or missing radiation machine.

(b) The licensee or registrant shall also make a report in writing within 30 days after learning of stolen, lost or missing sources of radiation described in K.A.R. 28-35-228a(1) or (2).

(c) The licensee or registrant shall make a report in writing within 30 days after learning of

stolen, lost or missing licensed or registered radioactive material in an aggregate quantity greater than 10 times the quantity specified in K.A.R. 28-35-234b appendix C that is still missing.

(d) The written report required in K.A.R. 28-35-228a(b) or (c) shall contain the following information:

(1) a description of the material involved, including the kind, quantity, chemical form, and physical form;

(2) a description of the circumstances under which the loss or theft occurred;

(3) a statement of the disposition or probable disposition of the material involved;

(4) radiation exposures to individuals, circumstances under which the exposures occurred, and the extent of possible total effective dose equivalent to persons in unrestricted areas;

(5) actions which have been taken, or will be taken, to recover the material; and

(6) procedures or measures which have been or will be adopted to prevent a reoccurrence of the theft or loss.

(d) After filing the written report the licensee or registrant shall also report to the department within 30 days of the date information becomes available, any substantive additional information on the theft or loss which becomes available.

(e) The licensee or registrant shall prepare any report filed with the department pursuant to K.A.R. 28-35-228a so that names of individuals who may have received exposure to radiation are stated in a separate and detachable portion of the report. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-229. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-229a. **Notification of incidents.** (a) Immediate notification. Each licensee or registrant shall immediately notify the department by telephone, telegraph, mailgram or facsimile of any incident involving any source of radiation possessed by the licensee or registrant which may have caused or threatens to cause:

(1) (A) a total effective dose equivalent to any individual of 25 rems (250 mSv) or more of radiation;

(B) an eye dose equivalent to any individual of 75 rems (.75 Sv) or more of radiation; or

(C) a shallow dose equivalent to the skin or extremities or a total organ dose equivalent to any individual of 250 rad (2.5 Gy) or more of radiation; or

(2) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake five times the occupational ALI. This provision does not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(b) Twenty-four hour notification. Each licensee or registrant shall, within 24 hours of the discovery of the event notify the department by telephone, telegraph, mailgram or facsimile of any incident involving any source of radiation possessed by the licensee or registrant which may have caused or threatens to cause:

(1) (A) a total effective dose equivalent to any individual exceeding five rems (50 mSv);

(B) an eye dose equivalent exceeding 15 Rem (0.15 Sv); or

(C) a shallow dose equivalent to the skin or to the extremities or a total organ dose equivalent exceeding 50 Rem (0.5 Sv); or

(2) the release of radioactive material, inside or outside of a restricted area, so that, had an individual been present for 24 hours, the individual could have received an intake in excess of one occupational ALI. This provision shall not apply to locations where personnel are not normally stationed during routine operations, such as hot-cells or process enclosures.

(c) Each report filed with the department pursuant to this regulation shall be prepared in such a manner that names of individuals who have received excessive doses are stated in a separate and detachable portion of the report.

(d) The provision of K.A.R. 28-35-229a shall not apply to doses that result from planned special exposures, provided such doses are within limits for planned special exposures and are reported pursuant to K.A.R. 28-35-230c. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-230. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended

Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-230a. **Reports of overexposures and excessive levels and concentrations.** (a) In addition to any notification required by K.A.R. 28-35-229a, each licensee or registrant shall make a report in writing, within 30 days of learning of any of the following occurrences, to the department of:

(1) each exposure of an individual to radiation in excess of the applicable standards in K.A.R. 28-35-212a, K.A.R. 28-35-213a, K.A.R. 28-35-213b, K.A.R. 28-35-214a or the license;

(2) each exposure of an individual to radioactive material in excess of the applicable limits in K.A.R. 28-35-212b(a)(1), K.A.R. 28-35-212b (a)(2), K.A.R. 28-35-213a(b), K.A.R. 28-35-213b, K.A.R. 28-35-213c or in the license;

(3) each incident in which levels of radiation or concentrations of radioactive material in a restricted area exceeded any other applicable limit in the license;

(4) any incident for which notification is required by K.A.R. 28-35-229a; and

(5) each incident in which levels of radiation or concentrations of radioactive material in an unrestricted area exceeded 10 times any applicable limit set forth in K.A.R. 28-35-211a through K.A.R. 28-35-234b, or in the license whether or not involving excessive exposure of any individual.

(6) For licensees subject to the provisions of U.S. environmental protection agency's generally applicable environmental radiation standards in 40 CFR 190, levels of radiation or releases of radioactive material in excess of those standards, or of license conditions related to those standards.

(b) Each report required under this regulation shall describe the extent of exposure of individuals to radiation or to radioactive material, including:

(1) estimates of each individual's dose;

(2) levels of radiation and concentrations of radioactive material involved;

(3) the cause of the exposure or excessive levels or concentrations; and

(4) corrective steps taken or planned to assure against a reoccurrence.

(c) Any report filed with the department under this regulation shall include for each individual exposed the individual's name, social security number, and date of birth, and an estimate of the individual's dose. With respect to the limit for the embryo/fetus in K.A.R. 28-35-213b, the identifiers shall be those of the declared pregnant woman. The report shall be prepared so that this information is stated in a separate and detachable part of the report. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-230b. **Misadministrations; reporting and recording.** (a) When a misadministration, as defined in K.A.R. 28-35-135(ii)(1) occurs the licensee shall notify the department by telephone. The licensee shall also notify the referring physician and the patient or a responsible relative or guardian, unless the referring physician of the affected patient agrees to inform the patient or believes, based on medical judgment, that telling the patient or a responsible relative or guardian would be harmful to one or the other respectively. These notifications shall be made within 24 hours after the licensee discovers the misadministration. If the patient, responsible relative or guardian or referring physician cannot be reached within 24 hours, they shall be informed as soon as practicable. The licensee shall not be required to notify the patient, responsible relative or guardian without first consulting the referring physician. However, the licensee shall not delay medical care for the patient for this reason.

(b) Within 15 days after the initial misadministration report by telephone to the department, the licensee shall provide a written report to the department, and shall furnish a copy of the report to the referring physician and the patient or the patient's responsible relative or guardian, if either was previously notified by the licensee under subsection (a) of this regulation.

(1) The written report shall include:

(A) the licensee's name;

(B) the referring physician's name;

(C) a brief description of the event;

(D) a brief description of the effect on the patient;

(E) a description of the action or actions taken to prevent recurrence; and

(F) a statement as to whether the licensee informed the patient or the patient's responsible relative or guardian, and if not, the reasons for not doing so.

(2) The report shall not include the patient's name or other information that could lead to identification of the patient.

(c) Each licensee shall keep a record of each misadministration for five years. The record shall contain:

(1) the names of all individuals involved in the event, including the physician, allied health personnel, the patient, and the patient's referring physician;

(2) the patient's social security number or identification number, if one has been assigned; and

(3) a brief description of the event, the effect on the patient and the action taken to prevent a recurrence.

(d) Aside from the notification requirement, nothing in this regulation shall be construed to affect any rights or duties of licensees and physicians in relation to each other, patients, or responsible relatives or guardians of patients. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-230c. **Reports of planned special exposures.** The licensee or registrant shall submit a written report to the department within 30 days following any planned special exposure conducted in accordance with K.A.R. 28-35-212f, which shall inform the department that a planned special exposure was conducted, indicate the date the planned special exposure occurred and contain the information required by K.A.R. 28-35-227g. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-230d. **Reports of individual monitoring.** (a) This section shall apply to each person licensed or registered by the department to:

(1) Possess or use sources of radiation for purposes of industrial radiography pursuant to K.A.R. 28-35-181g and K.A.R. 28-35-274 through K.A.R. 28-35-289 of these regulations; or

(2) receive radioactive waste from other persons for disposal pursuant to K.A.R. 28-35-180, and K.A.R. 28-35-223a(b)(1) of these regulations; or

(3) possess or use at any time, for processing or manufacturing for distribution pursuant to K.A.R. 28-35-180 or K.A.R. 28-35-261 through K.A.R. 28-35-263 of these regulations, radioactive material in quantities exceeding any one of the following quantities:

Radionuclide	Activity	
	Ci	GBq
Cesium-137	1	37
Cobalt-60	1	37
Gold-198	100	3,700
Iodine-131	1	37
Iridium-192	10	370
Krypton-85	1,000	37,000
Promethium-147	10	370
Technetium-99m	1,000	37,000

(b) The department may require as a license condition, or by rule, regulation, or order pursuant to K.A.R. 28-35-230d, reports from licensees or registrants who are licensed or registered to use radionuclides not on the table in paragraph (a)(3) of this regulation, if they are used in quantities sufficient to cause comparable radiation levels.

(c) Each licensee or registrant in a category listed in K.A.R. 28-35-230d shall submit an annual report of the results of individual monitoring carried out by the licensee or registrant for each individual for whom monitoring was required by K.A.R. 28-35-217b during that year.

(1) The licensee or registrant may include additional data for individuals for whom monitoring was provided but not required.

(2) The licensee or registrant shall use a form approved by the department or electronic media containing all the information required by the approved form.

(d) The licensee or registrant shall file the report required by K.A.R. 28-35-230d, covering the preceding year, on or before April 30 of each year. The licensee or registrant shall submit the report to the department. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-230e. **Notifications and reports to individuals.** (a) When a licensee or registrant is required pursuant to K.A.R. 28-35-230a to report to the department any exposure of an individual to radiation or radioactive material, the licensee or registrant shall also notify the individual.

(b) Notice to the individual shall be transmitted at a time not later than the transmittal to the department, and shall comply with the provisions of K.A.R. 28-35-334 of these regulations. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-230f. **Reports of leaking or contaminated sealed sources.** If a test for leakage or contamination pursuant to K.A.R. 28-35-216a indicates a sealed source is leaking or contaminated, a report of the test shall be filed within five days with the department describing the equipment involved, the test results and the corrective action taken. (Authorized by and implementing K.S.A. 1993 Supp. 48-1607; effective Oct. 17, 1994.)

28-35-231. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-231a. **Vacating installations.** Licensees, before vacating any installation which may have been contaminated by radioactive material as a result of the licensee's activities, shall, no less than 15 days prior to such vacating, notify the department in writing of intent to vacate. The department may require that the licensee decontaminate, or have decontaminated, the installation to a degree consistent with subsequent use as an uncontrolled area, the details to be specified in each case by the department. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985.)

28-35-231b. **Transfer for disposal and manifests.** (a) Each shipment of radioactive waste to a licensed land disposal facility shall be accompanied by a shipment manifest that contains:

(1) the name, address, and telephone number of the person generating the waste;

(2) the name, address, and telephone number or the name and U.S. environmental protection agency hazardous waste identification number of the person transporting the waste to the land disposal facility;

(3) a physical description, which is as complete as practicable, of:

(A) the waste;

(B) the waste volume;

(C) the radionuclide identity and quantity;

(D) the total radioactivity; and

(E) the principal chemical form;

(4) the identity of the solidification agent;

(5) the identity of any wastes containing more than 0.1 percent chelating agents by weight and an estimate of the weight percentage of the chelating agent;

(6) a clear identification of wastes classified as class A, class B, or class C in K.A.R. 28-35-223b, unless transferred to a waste processor who treats or repackages wastes; and

(7) the total quantity of the radionuclides H-3, C-14, Tc-99, and I-129 in the waste shipment.

(b) The manifest required in this regulation may consist of shipping papers used to meet U.S. department of transportation or U.S. environmental protection agency regulations or requirements of the receiver, if all the information required in subsection (a) of this regulation is included.

(c) Each manifest shall include a certification by the waste generator that the transported materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the U.S. department of transportation 40 CFR Parts 180-189 in effect on December 31, 1982 and the department. An authorized representative of the waste generator shall sign and date the manifest.

(d) Each licensee that transfers waste to a licensed waste processor who treats or repackages waste shall comply with the requirements of K.A.R. 28-35-231b (d)(4) through (8). Each licensee who transfers waste to a land disposal facility or who is a licensed waste collector shall:

(1) prepare all wastes so that the waste is classified according to K.A.R. 28-35-223b and meets the waste characteristics requirements in K.A.R. 28-35-223c;

(2) label each package of waste to identify whether it is class A, class B, or class C waste, in accordance with K.A.R. 28-35-223d;

(3) conduct a quality control program that assures compliance with K.A.R. 28-35-223b and 28-35-223d and includes a management evaluation of audits;

(4) prepare shipping manifests to meet the requirements of K.A.R. 28-35-231b (b) and (c);

(5) (A) forward a copy of the manifest to the intended recipient at the time of shipment; or

(B) deliver a copy to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest from the collector;

(6) include one copy of the manifest with the shipment;

(7) retain a copy of the manifest with documentation of the acknowledgment of receipt as the record of transfer of licensed material required by these regulations; and

(8) conduct an investigation in accordance with K.A.R. 28-35-231b(h) for any shipment, or any part of a shipment, for which acknowledgment of receipt has not been received within the times set forth in this regulation.

(e) Each waste collector licensee who handles only prepackaged waste shall:

(1) acknowledge receipt of the waste from the generator within one week of receipt by returning a signed copy of the manifest;

(2) prepare a new manifest to reflect consolidated shipments. The new manifest shall serve as a listing or index for the detailed generator manifests, and copies of the generator manifests shall become a part of the new manifest. The waste collector may prepare a new manifest without attaching the generator manifests, if the new manifest contains for each package the information specified in K.A.R. 28-35-231b(a). The collector licensee shall certify that nothing has been done to the waste which would invalidate the generator's certification;

(3) forward a copy of the new manifest to the land disposal facility operator at the time of shipment;

(4) include the new manifest with the shipment to the disposal site;

(5) retain a copy of the manifest, documentation of acknowledgment of receipt as the record of transfer of licensed material in accordance with these regulations, and retain information from generator manifests until disposition is authorized by the department; and

(6) conduct an investigation in accordance with K.A.R. 28-35-231b(h) for any shipment, or any part of a shipment, for which acknowledgment of receipt is not received within the times set forth in this regulation.

(f) Each licensed waste processor who treats or repackages wastes shall:

(1) acknowledge receipt of the waste from the generator within one week of receipt by returning a signed copy of the manifest;

(2) prepare a new manifest that meets the requirements of K.A.R. 28-35-231b (a) and (c), and reflects that the processor is responsible for the waste;

(3) prepare all wastes so that the waste is classified according to this regulation and meets the waste characteristics requirement in 28-35-233c;

(4) label each package of waste to identify whether it is class A, class B, or class C waste, in accordance with K.A.R. 28-35-223b and 28-35-223d;

(5) conduct a quality control program that assures compliance with K.A.R. 28-35-223b and 28-35-223c and includes management evaluation of audits;

(6) forward a copy of the new manifest to the disposal site operator or waste collector at the time of shipment, or deliver the new manifest to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest by the collector;

(7) include the new manifest with the shipment;

(8) retain copies of original manifests and new manifests with documentation of acknowledgment of receipt as the record of transfer of licensed material required by these regulations; and

(9) conduct an investigation in accordance with K.A.R. 28-35-231b(h) for any shipment, or part of a shipment, for which acknowledgment is not received within the times set forth in this section.

(g) The disposal facility operator shall:

(1) acknowledge receipt of the waste within one week of receipt by returning a signed copy of the manifest to the shipper. The shipper to be notified shall be the licensee who last possessed the waste and transferred the waste to the operator. The returned copy of the manifest shall indicate any discrepancies between materials listed on the manifest and materials received;

(2) maintain copies of all completed manifests until the department authorizes their disposition; and

(3) notify the shipper and the department when any shipment or part of a shipment has not arrived within 60 days after the advance manifest was received.

(h) Any shipment or part of a shipment for which acknowledgment is not received within the times set forth in this regulation shall:

(1) be investigated by the shipper if the shipper has not received notification of receipt within 20 days after transfer; and

(2) be traced and reported to the department. Each licensee who conducts a trace investigation shall file a written report with the department within two weeks of completion of the investigation.

(i) Copies of manifests required by this regulation may be legible carbon copies or legible photocopies. (Authorized by and implementing

K.S.A. 1993 Supp. 48-1607; effective, T-86-37, Dec. 11, 1985; effective May 1, 1986; amended Sept. 20, 1993; amended Oct. 17, 1994.)

28-35-232. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-232a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; revoked Oct. 17, 1994.)

28-35-233. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-233a. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; revoked Oct. 17, 1994.)

28-35-234. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-234a. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective, T-85-43, Dec. 19, 1984; effective May 1, 1985; amended Sept. 20, 1993; revoked Oct. 17, 1994.)

28-35-235 to 22-35-240. **Reserved.**

PART 5.—USE OF X-RAYS IN THE HEALING ARTS

28-35-241. **Purpose and scope.** This part establishes requirements for use of x-rays in medicine, dentistry, osteopathy, chiropractic, podiatry, and veterinary medicine. The provisions of this part are in addition to, and not in substitution for, other applicable provisions of these regulations. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970.)

28-35-242. **General provisions.** (a) Waiver of requirements. Compliance with the specific requirements of these regulations relative to an existing machine or installation may be waived by the department if the registrant provides an alternative to the requirement which provides radiation protection equal to that prescribed in 28-35-212a, 28-35-213a and 28-35-214a.

(b) Responsibility to meet requirements. A person shall not make, sell, lease, transfer, lend, or install x-ray or fluoroscopic equipment, or the supplies used in connection with such equipment, unless:

(1) those supplies and equipment, when properly placed in operation and properly used, will meet the requirements of parts 1, 4, 5, and the applicable regulations under parts 7, 8, and 10 of K.A.R. 28-35-133 to 28-35-339 and

(2) such person delivers, where applicable, cones or collimators, filters, adequate timers and fluoroscopic shutters.

(c) Limitations on human use. An individual shall not be exposed to the useful beam unless the exposure is for healing arts purposes, and each exposure has been authorized by a licensed practitioner of the healing arts, or by persons licensed to practice dentistry or podiatry within the authority granted to them by Kansas licensing laws applying to dentists and podiatrists. Deliberate exposure for the following purposes shall be specifically prohibited under this subsection:

(1) exposure of an individual for training, demonstration or other purposes unless there are also healing arts requirements and a proper prescription has been provided; and

(2) exposure of an individual for the purpose of healing arts screening without prior written approval of the department. ''Screening'' means an exposure of a person without a prior examination by a licensed practitioner. When requesting such an approval, that person shall submit the information outlined in K.A.R. 28-35-255, appendix D. If any information submitted to the department becomes invalid or outdated, the department shall be immediately notified.

(d) Administrative controls.

(1) Each registrant shall be responsible for directing the operation of the x-ray system or systems under the registrant's administrative control. The registrant or the registrant's agent shall assure that the requirements of this part are met in the operation of the x-ray system or systems.

(2) An x-ray system which does not meet the provisions of these regulations shall not be operated for diagnostic or therapeutic purposes, if so directed by the department.

(3) Individuals who will be operating the x-ray systems shall be adequately instructed in safe operating procedures and be competent in safe use of the equipment.

(4) A chart shall be provided in the vicinity of the diagnostic x-ray system's control panel which specifies, for all examinations performed with that system, the following information:

(A) technique factors to be used for the patient's anatomical size;

(B) the type and size of the film or film-screen combination to be used;

(C) type and focal distance of the grid to be used, if any;

(D) the source to image receptor distance to be used; and

(E) type and location of placement of gonad shielding to be used.

(5) Written safety procedures shall be provided to each individual operating x-ray equipment, including any restrictions of the operating technique required for the safe operation of the particular x-ray system. The operator shall be able to demonstrate familiarity with these procedures.

(6) Except for patients who cannot be moved out of the room, only the staff and ancillary personnel required for the medical procedure or training shall be in the room during the radiographic exposure. The following protective measures shall be taken.

(A) Other than the patient being examined, all individuals shall be positioned such that no part of the body will be struck by the useful beam unless protected by 0.5 millimeter lead equivalent.

(B) Other than the patient being examined, staff and ancillary personnel shall be protected from the direct scatter radiation by protective aprons or whole body protective barriers of not less than 0.25 millimeter lead equivalent.

(C) Patients other than the patient being examined who cannot be removed from the room shall be protected from the direct scatter radiation by whole body protective barriers of 0.25 millimeter lead equivalent or shall be so positioned that the nearest portion of the body is at least two meters (six feet) from both the tube head and the nearest edge of the image receptor.

(7) When a patient or film must be provided with auxiliary support during a radiation exposure, the following procedure shall be observed.

(A) Mechanical holding devices shall be used when the technique permits. The written safety procedures required by K.A.R. 28-35-242 (d)(5) shall list individual projections where holding devices cannot be utilized.

(B) Written safety procedures, as required by K.A.R. 28-35-242 (d)(5), shall indicate the requirements for selecting a holder and the procedure the holder shall follow.

(C) Each human holder shall be protected as required by K.A.R. 28-35-242 (d)(6).

(D) No individual shall be used routinely to hold film or patients.

(E) Each patient holding film shall have body parts other than the area of clinical interest protected from useful beam by shielding equivalent to 0.5 millimeter of lead equivalent material. This request is not applied to an intraoral exam where the patient must hold the film.

(8) Procedures and auxiliary equipment designed to minimize patient and personnel exposure commensurate with the needed diagnostic information shall be utilized.

(A) The speed of film or screen and film combinations shall be the fastest speed consistent with the diagnostic objective of the examinations.

(B) The radiation exposure to the patient shall be the minimum exposure required to produce images of good diagnostic quality.

(C) Portable or mobile x-ray equipment shall be used only for examinations where it is impractical to transfer the patient or patients to a stationary x-ray installation.

(D) X-ray systems subject to K.A.R. 28-35-244 shall not be utilized in procedures where the source to patient distance is less than 30 centimeters (12 inches).

(9) The tube housing of a diagnostic or therapeutic x-ray machine operating at 60 kVp or more shall not be hand-held during exposure.

(10) Gonadal shielding of not less than 0.25 mm lead equivalent shall be used for patients who have not passed the reproductive age during radiographic procedures in which the gonads are in the direct (useful) beam, except for cases in which this would interfere with the diagnostic procedure.

(11) All persons who are associated with the operation of an x-ray system shall be subject to the occupational exposure limits and the requirements for the determination of the doses which are stated in K.A.R. 28-35-212a. In addition, the following requirements shall be met.

(A) When protective clothing or devices are worn on portions of the body and one or more monitoring devices are required, at least one monitoring device shall be utilized as follows.

(i) When an apron is worn, the monitoring device shall be worn at the collar outside of the apron.

(ii) The dose to the device, if one is used, shall be recorded as the whole body dose based on the maximum dose attributed to any one critical organ, including the gonads, the blood forming or-

gans, head and trunk, or lens of the eye, as required by K.A.R. 28-35-227a. If more than one device is used and a record is made of the data, each dose shall be identified with the area where the device was worn on the body.

(B) Exposure of a personnel monitoring device to deceptively indicate a dose delivered to an individual shall be prohibited.

(12) All films shall be processed in accordance with the provisions of K.A.R. 28-35-252, appendix A.

(e) Shielding.

(1) Each installation shall be provided with any primary barriers or secondary barriers that are necessary to assure compliance with K.A.R. 28-35-212a and 28-35-214a. This requirement shall be deemed to be met if the thickness of the barriers is equivalent to that as computed in accordance with appendix B, national council on radiation protection and measurements report No. 49 "structural shielding design and evaluation for medical x-rays and gamma-rays of energies up to (10) MeV," September 1976.

(2) Lead barriers shall be mounted in such a manner that they will not sag or cold-flow because of their own weight, and shall be protected against mechanical damage.

(3) Joints between different kinds of protective materials shall be so designed that the overall protection of the barrier is not impaired.

(4) Joints at the floor and ceiling shall be so designed that the overall protection is not impaired.

(5) Windows, window frames, doors, and door frames shall have the same lead equivalent as that required of the adjacent wall.

(6) Holes in protective barriers shall be covered so that overall attenuation is not impaired.

(f) Records. Each registrant shall maintain the following minimum information for each x-ray system for inspection by the department:

(1) the maximum rating of technique factors;

(2) the model and serial numbers of all certifiable components;

(3) the aluminum equivalent filtration of the useful beam, including any routine variation;

(4) tube rating charts and cooling curves;

(5) records of surveys, calibrations, maintenance, and modifications performed on the x-ray system or systems after the effective date of this regulation with the names of persons who performed such services;

(6) a scale drawing of the room in which a stationary x-ray system is located, indicating the use of areas adjacent to the room and an estimation of the extent of occupancy by an individual in such areas. In addition, the drawing shall include:

(A) the results of a survey for radiation levels present at the operator's position and at pertinent points outside the room at specified test conditions; or

(B) the type and thickness of materials, or lead equivalency, of each protective barrier;

(7) a copy of all correspondence with the department regarding that x-ray system; and

(8) an x-ray log maintained by the facility, containing the patient's name, the type of examinations, and the dates the examinations were performed. When the patient or film must be provided with human auxiliary support, the name of the human holder shall be recorded.

(g) General requirements for all diagnostic x-ray systems. In addition to other requirements of K.A.R. 28-35-242, 28-35-243, 28-35-244, 28-35-245, 28-35-246, 28-35-247, and 28-35-248, all diagnostic x-ray systems shall meet the following general requirements:

(1) Battery charge indicator. On battery-powered generators, visual means shall be provided on the control panel to indicate whether the battery is in a state of charge adequate for proper operation.

(2) Radiation from components other than the diagnostic source assembly. The radiation emitted by a component other than the diagnostic source assembly shall not exceed two milliroentgens (0.52 uC/kg) in one hour at five centimeters (two inches) from any accessible surface of the component when it is operated in an assembled x-ray system under any conditions for which it was designed. Compliance shall be determined by measurements averaged over an area of 100 square centimeters with no linear dimension greater than 20 centimeters (eight inches).

(3) Beam quality.

(A) Half-value layer.

(i) The half-value layer (HVL) of the useful beam for a given x-ray tube potential shall not be less than the values shown in table I except when contraindicated for a particular diagnostic procedure. If it is necessary to determine the half-value layer at an x-ray tube potential which is not listed in table I, linear interpolation or extrapolation may be used.

Table I

Design operating range (kilovolts peak)	*Measured potential (kilovolts peak)*	*Half-value layer (millimeters of aluminum)*
Below 50	30	0.3
	40	0.4
	49	0.5
50 to 70	50	1.2
	60	1.3
	70	1.5
Above 70	71	2.1
	80	2.3
	90	2.5
	100	2.7
	110	3.0
	120	3.2
	130	3.5
	140	3.8
	150	4.1

(ii) The above HVL criteria shall be considered to have been met if it can be demonstrated that the aluminum equivalent of the total filtration in the primary beam is not less than that shown in table II.

Table II
Filtration Required vs. Operating Voltage

Operating voltage (kVp)	*Total filtration (inherent plus added) (millimeters aluminum equivalent)*
Below 50	0.5 millimeters
50 to 70	1.5 millimeters
Above 70	2.5 millimeters

(B) Beryllium window tubes shall have a minimum of 0.5 mm aluminum equivalent filtration permanently mounted in the useful beam.

(C) For capacitor energy storage equipment, compliance shall be determined with the maximum quantity of charge per exposure.

(D) The required minimal aluminum equivalent filtration shall include the filtration contributed by all materials which are always present between the focal spot of the tube and the patient, including a tabletop when the tube is mounted "under the table" and inherent filtration of the tube.

(4) Mechanical support of tube head. The tube housing assembly supports shall be adjusted so that the tube housing assembly will remain stable during an exposure unless the tube housing movement is a designed function of the x-ray system.

(5) Leakage radiation from the diagnostic source assembly. The leakage radiation from the diagnostic source assembly shall not exceed 100 milliroentgens (25.8 uC/kg) in one hour at one meter from any accessible surface of the source assembly when it is operated at its leakage technique factors. Compliance shall be determined by measurements averaged over an area of 100 square centimeters (15.5 square inches) with no linear dimension greater than 20 (7.87 inches) centimeters.

(6) Warning label. The control panel containing the main power switch shall bear the following warning statement, legible and accessible to view: "WARNING: This x-ray unit may be dangerous to patient and operator unless safe exposure factors and operating instructions are observed."

(h) Plan review.

(1) Prior to construction, the floor plans and equipment arrangement of all new installations, or modifications of existing installations, utilizing x-rays for diagnostic or therapeutic purposes shall be submitted to the department for review and approval, as required by K.A.R. 28-35-253 and 28-35-254, appendices B and C of this part.

(2) Prior to the plan review and approval, the applicant may be required by the department to utilize the services of a qualified expert to determine the shielding requirements.

(3) The approval of the plans shall not preclude the requirement of additional modifications should a subsequent analysis of operating conditions indicate the possibility of an individual receiving a dose in excess of the limits prescribed in K.A.R. 28-35-212a and 28-35-214a of these regulations. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976; amended Sept. 20, 1993.)

28-35-243. **Fluoroscopic installation.** (A) *Equipment.* (1) The tube housing shall be of diagnostic type.

(2) The source to skin distance shall not be less than 30 centimeters (12 inches) on all mobile fluoroscopes.

(3) The source to skin distance shall not be less than: (a) 38 centimeters (15 inches) on stationary fluoroscopes installed after the effective date of this regulation.

(b) 35.5 centimeters (14 inches) on stationary fluoroscopes which are in operation prior to the effective date of these regulations.

(c) 20 centimeters (8 inches) for image intensified fluoroscopes used for specific surgical application. The users operating manual must provide precautionary measures to be adhered to during the use of this device.

(4) The equipment shall be so constructed that the entire cross section of the useful beam is attenuated by a primary protective barrier, permanently incorporated into the equipment. (a) The

exposure shall terminate automatically when the barrier is removed from this useful beam.

(b) The required lead equivalent of the barrier shall not be less than 1.5 millimeters for 100 kVp, not less than 1.8 millimeters for 125 kVp, and not less than 2.0 millimeters for 150 kVp.

(c) Barrier transmitted radiation rate limits: (i) The exposure rate due to transmission through the primary protective barrier with the attenuation block in the useful beam, combined with radiation from the image intensifier, if provided, shall not exceed two (2) milliroentgens per hour at ten (10) centimeters (4 inches) from any accessible surface of the fluoroscopic imaging assembly beyond the plane of the image receptor for each roentgen per minute of entrance exposure rate. (ii) Measuring compliance of barrier transmission: (a) The exposure rate due to transmission through the primary protective barrier combined with radiation from the image intensifier shall be determined by measurements averaged over an area of 100 square centimeters with no linear dimension greater than 20 centimeters (8 inches). (b) If the source is below the tabletop, the measurement shall be made with the input surface of the fluoroscopic imaging assembly, positioned 30 centimeters (12 inches) above the tabletop. (c) If the source is above the tabletop and the SID is variable, the measurement shall be made with the end of the beam-limiting device or spacer as close to the tabletop as it can be placed, provided that it shall not be closer than 30 centimeters (12 inches). (d) Movable grids and compression devices shall be removed from the useful beam during the measurement. (e) The attenuation block shall be positioned in the useful beam ten (10) centimeters (4 inches) from the point of measurement of entrance exposure rate and between this point and the input surface of the fluoroscopic imaging assembly.

(d) Collimators and/or shutters which restrict the beam to an area less than that of the barrier shall be provided.

(e) Image intensified fluoroscopy and spot filming: (i) During fluoroscopic or spot-filming procedures, neither the length nor the width of the x-ray field in the plane of the image receptor shall exceed the visible area of the image receptor by more than three (3) percent of the SID. The sum of the excess length and the excess width shall be no greater than four (4) percent of the SID. (ii) Compliance shall be determined with the beam axis perpendicular to the image receptor. For rectangular x-ray fields used with circular image reception, the error in alignment shall be determined along the length and width dimensions of the x-ray field which pass through the center of the visible area of the image receptor.

(f) The tube mounting and the barrier shall be so linked together that the barrier always intercepts the useful beam.

(g) Collimators, adjustable diaphragms, and shutters shall provide the same degree of attenuation as required for the tube housing.

(5) X-ray production in the fluoroscopic mode shall be controlled by a device which requires continuous pressure by the fluoroscopist for the entire time of any exposure. When recording serial fluoroscopic images, the fluoroscopist shall be able to terminate the x-ray exposure(s) at any time, but means may be provided to permit completion of any single exposure of the series in process.

(6) *Control of scattered radiation.* (a) Fluoroscopic table designs when combined with procedures utilized shall be such that no unprotected part of any staff or ancillary person's body shall be exposed to unattenuated scattered radiation which originates from under the table. The attenuation required shall be not less than 0.25 mm lead equivalent.

(b) Equipment configuration when combined with procedures shall be such that no portion of any staff or ancillary person's body, except the extremities, shall be exposed to the unattenuated scattered radiation emanating from above the tabletop unless that individual: (i) is at least 120 cm from the center of the useful beam, or (ii) the radiation has passed through not less than 0.25 mm lead equivalent material (e.g., drapes, bucky-slot cover-sliding or folding panel, or self supporting curtains) in addition to any lead equivalency provided by a protective apron. (iii) Exceptions to 28-35-243 (A) (6) (b) (ii) may be made in some special procedures where a sterile field will not permit the use of the normal protective barriers.

(7) *Fluoroscopic timer.* (a) Means shall be provided to preset the cumulative on-time of the fluoroscopic tube. The maximum cumulative time of the timing device shall not exceed five (5) minutes without resetting.

(b) A signal audible to the fluoroscopist shall indicate the completion of any preset cumulative on-time. Such signal shall continue to sound while

x-rays are produced until the timing device is reset.

(8) Devices which indicate the x-ray tube potential and current shall be provided.

(9) *Entrance exposure rate limits.* (a) The exposure rate measured at the point where the center of the useful beam enters the patient shall not exceed ten (10) roentgens per minute, except during recording of fluoroscopic images or when provided with optional high level control.

(b) When provided with optional high level control, the equipment shall not be operable at any combination of tube potential and current which will result in an exposure rate in excess of five (5) roentgens per minute at the point where the center of the useful beam enters the patient unless the high level control is activated. (i) Special means of activation of high level controls, such as additional pressure applied continuously by the operator, shall be required to avoid accidental use. (ii) A continuous signal audible to the fluoroscopist shall indicate that the high level control is being employed. (iii) Compliance with 28-35-243 (A) (9) shall be determined as follows: (a) Movable grids and compression devices shall be removed from the useful beam during the measurement. (b) If the source is below the table, the exposure rate shall be measured one (1) centimeter (0.4 inches) above the tabletop or cradle. (c) If the source is above the table, the exposure rate shall be measured at thirty (30) centimeters (12 inches) above the tabletop with the end of the beam-limiting device or spacer positioned as closely as possible to the point of measurement. (d) On a C-arm type of fluoroscope, the exposure rate shall be measured thirty (30) centimeters (12 inches) from the input surface of the fluoroscopic imaging assembly.

(10) Extraneous light that interferes with the fluoroscopic examination shall be eliminated.

(11) *Periodic measurement of entrance exposure rate limits:* (a) Periodic measurements of the exposure rate shall be made. An adequate period for such measurements shall be annually or after any maintenance of the system which might affect the exposure rate.

(b) Results of these measurements shall be posted where any fluoroscopist may have ready access to them while using that fluoroscope and in the record required in 28-35-242 (F). Results of the measurements shall include the maximum possible R/minute, as well as the physical factors used to determine all data; the name of the person performing the measurements; and the date the measurements were performed.

(c) Monitoring devices (*e.g.* commercially available film badges, thermoluminescent dosimeters, or low energy dosimeters) may be used to perform the test, provided the measurements are made as noted in the following: (i) The measurement shall be made under the conditions that satisfy the requirements of 28-35-243 (A) (9). (ii) The kVp shall be the peak kV that the x-ray system is capable of producing. (iii) The high level control, if present, shall not be activated. (iv) The x-ray system(s) that incorporates automatic exposure control (automatic brightness control, etc.) shall have sufficient material (*e.g.* lead or lead equivalence) placed in the useful beam to produce the maximum milliamperage of the x-ray system. (v) x-ray system(s) that do not incorporate automatic exposure control shall utilize the maximum milliamperage of the x-ray system. Materials (*e.g.* an attenuation block) may be placed in the useful beam to protect the imaging system.

(12) Records of measurements shall be maintained for inspection by the department.

(13) Mobile fluoroscopic equipment shall meet the requirements of this section [28-35-243 (A)], where applicable, except that: (a) Image intensification shall always be provided. Conventional fluoroscopic screens shall not be used.

(B) *Structural shielding.* Ordinarily, only secondary barriers are necessary except for combined fluoroscopic-radiographic installations. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended May 1, 1976.)

28-35-244. **Radiographic installations other than dental intra-oral and veterinary medicine.** (A) *Equipment.* (1) The tube housing shall be of the diagnostic type.

(2) Diaphragms, cones, or adjustable collimators, capable of restricting the useful beam to the area of clinical interest shall be provided and shall afford the same degree of protection as is required of the tube housing.

(3) *Timers.* Means shall be provided to terminate the exposure at a preset time interval, preset product of current and time, a preset number of pulses, or a preset radiation exposure to the image receptor. In addition, (a) It shall not be possible to make an exposure when the timer is set to a zero or off position if either position is provided.

(4) A dead-man type exposure switch shall be provided and so installed that it cannot be operated outside a shielded area. Exposure switches for ''spot film'' devices used in conjunction with fluoroscopic tables are excepted from this shielding requirement.

(5) (a) The control panel shall include a device (usually a milliammeter) which will give positive indication of the production of x-rays whenever the x-ray tube is energized.

(b) The control panel shall include appropriate indicators (labeled control settings and/or meters) indicating the physical factors employed, including kVp, mA, time and/or phototime.

(6) *Standby radiation from capacitor energy storage equipment.* Radiation emitted from the x-ray tube when the exposure switch or timer is not activated shall not exceed a rate of two (2) milliroentgens per hour at five (5) centimeters (2 inches) from any accessible surface of the diagnostic source assembly, with the beam-limiting device fully open.

(B) *Structural shielding.* (1) All wall, floor, and ceiling areas exposed to the useful beam shall have primary barriers.

(2) Secondary barriers shall be provided in all wall, floor, and ceiling areas which do not have primary barriers or where the primary barrier requirements are lower than the secondary barrier requirements.

(3) The operator's position shall be behind a protective barrier either in a separate room, in a protected booth, or behind a shield which will intercept the useful beam and any radiation which has been scattered only once.

(4) A window of lead-equivalent glass, equal to that required by the adjacent barrier or a viewing system, shall be provided and so arranged that the operator can see the patient without leaving the protected area during exposure.

(C) *Operating procedures.* (1) When a patient must be held in position for radiography, mechanical supporting or restraining devices should be used. If the patient must be held by an individual, that individual shall be protected with appropriate shielding devices such as protective gloves and apron, and he shall be so positioned that no part of his body, except hands and arms, will be struck by the useful beam.

(2) Only individuals required for the radiographic procedure shall be in the radiographic room during exposures and, except for the patient, all such persons shall be equipped with appropriate protection devices. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976.)

28-35-245. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked Sept. 20, 1993.)

28-35-246. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked Sept. 20, 1993.)

28-35-247. **Dental intraoral radiographic installations.** In addition to the provisions of K.A.R. 28-35-242, x-ray equipment and associated facilities used for dental radiography shall comply with the requirements of this regulation. Extraoral dental radiographic systems shall be in compliance with K.A.R. 28-35-244.

(a) Field limitation.

(1) Each radiographic system designed for use with an intraoral image receptor shall be provided with a means to limit the x-ray beam so that:

(A) if the minimum SSD is 18 centimeters (seven inches) or more, the x-ray field at the minimum SSD shall be containable in a circle having a diameter of no more than seven centimeters (2.76 inches); or

(B) if the minimum SSD is less than 18 centimeters (seven inches), the x-ray field at the minimum SSD shall be containable in a circle having a diameter of no more than six centimeters (2.36 inches).

(2) If the radiographic system cannot be fitted with a diaphragm or cone which will reduce the beam diameter to the required dimension, the beam diameter may be 7.6 centimeters (3 inches) at the minimum SSD.

(3) If an open-ended, shielded position-indicating-device (PID) is used, the shielding shall be equivalent to the requirements for a diagnostic source assembly.

(b) Source-to-skin distance (SSD). Each x-ray system designed for use with an intraoral image receptor shall be provided with means to limit source-to-skin distance, to not less than:

(1) 18 centimeters (seven inches), if operable above 50 kVp; or

(2) 10 centimeters (four inches) if not operable above 50 kVp.

(c) Timers. A means shall be provided to terminate the exposure at a preset time interval, a preset product of current and time, a preset number of pulses, or a preset radiation exposure to the

image receptor. In addition, it shall not be possible to make an exposure when the timer is set to a zero or off position, if either position is provided.

(d) X-ray control.

(1) An x-ray control shall be incorporated into each x-ray system so that an exposure can be terminated by the operator at any time, except for exposures of one-half second or less.

(2) Each x-ray control shall be located in a way that meets the following requirements.

(A) Each stationary x-ray system shall be required to have the x-ray control permanently mounted in a way that requires the operator to remain in a protected area during the entire exposure.

(B) (i) The control for mobile and portable x-ray systems which are used for greater than one week in the same location, such as a room or suite, shall meet the requirements of K.A.R. 28-35-247 (d)(2)(A);

(ii) The control for mobile and portable x-ray systems which are used for greater than one hour and less than one week at the same location, such as a room or suite, shall meet the requirements of K.A.R. 28-35-247 (d)(2)(B)(i) or be provided with a 6.5 feet (1.98 m) high protective barrier which is placed at least six feet (1.83 m) from the tube housing assembly and at least six feet (1.83 m) from the patient.

(iii) The control for mobile and portable x-ray systems which are used to make one or more exposures of a patient at the use location shall meet the requirements of K.A.R. 28-35-247 (d)(2)(B)(i) or (ii) or be provided with a method of x-ray control which will permit the operator to be at least 12 feet (3.66 m) from the tube housing assembly during an exposure.

(3) The x-ray control shall provide a visual indication observable at or from the operator's protected position whenever x-rays are produced. In addition, a signal audible to the operator shall indicate that the exposure has terminated.

(e) Exposure reproducibility. The coefficient of variation shall not exceed 0.10 when all technique factors are held constant. This requirement shall be deemed to have been met if, when four exposures are made with identical technique factors, the value of the average exposure (E) is greater than or equal to five times the maximum exposure (E_{max}) minus the minimum exposure (E_{min}): $E > 5 (E_{max} - E_{min})$.

(f) Operating procedures.

(1) During each exposure, the operator shall stand at least 3.66 meters (12 feet) from the patient or behind a protective barrier.

(2) Only the patient shall be in the useful beam.

(g) Administrative controls.

(1) Patient and film-holding devices shall be used when the techniques permit.

(2) The tube housing and the PID shall not be hand-held during an exposure.

(3) The x-ray system shall be operated in such a manner that the useful beam at the patient's skin does not exceed the requirements of K.A.R. 28-35-247 (a)(1).

(4) Dental fluoroscopy without image intensification shall not be used.

(h) Additional requirements applicable to certified systems only. Only diagnostic x-ray systems incorporating one or more certified components shall be required to comply with the following additional requirements which relate to those certified components.

(1) Reproducibility. When the equipment is operated on an adequate power supply as specified by the manufacturer, the estimated coefficient of variation of radiation exposures shall be no greater than 0.05, for any specific combination of selected technique factors.

(2) Linearity. When the equipment allows a choice of x-ray tube current settings and is operated on a power supply as specified by the manufacturer in accordance with the requirements of applicable federal standards, for any fixed x-ray tube potential within the range of 40 to 100 percent of the maximum rating, the average ratios of exposure to the indicated milliampere-seconds product obtained at any two consecutive tube current settings shall not differ by more than 0.10 times their sum:

$$|X_1 - X_2| < 0.10 (X_1 + X_2)$$

where X_1 and X_2 are the average mR/mAs values obtained at each of two consecutive tube current settings.

(3) Accuracy. Each certified dental x-ray system manufactured on and after December 1, 1980, shall have a minimum half-value layer not less than 1.5 millimeters aluminum equivalent. Systems operating above 70 kVp are subject to the filtration requirements of K.A.R. 28-35-244 (e)(1). (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended

Jan. 1, 1972; amended May 1, 1976; amended Sept. 20, 1993.)

28-35-248. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976; revoked Sept. 20, 1993.)

28-35-249. **Therapeutic x-ray systems of less than one MeV.** (a) Equipment requirements.

(1) Leakage radiation. When the tube is operated at its leakage technique factors, the leakage radiation shall not exceed the value specified at the distance specified for the classification of that x-ray system as set out below.

(A) Contact therapy systems. Leakage radiation shall not exceed 100 milliroentgens (25.8 uC/kg) per hour at five centimeters (two inches) from the surface of the tube housing assembly.

(B) 0-150 kVp systems manufactured or installed prior to May 31, 1989. Each system shall have a leakage radiation which does not exceed one roentgen (0.258 mC/kg) in one hour at one meter (39.37 inches) from the source.

(C) 0-150 kVp systems manufactured on or after May 31, 1989. Each system shall have a leakage radiation which does not exceed 100 milliroentgens (25.8 uC/kg) in one hour at one meter (39.37 inches) from the source.

(D) 151 to 999 kVp systems. The leakage radiation shall not exceed one roentgen (0.258 mC/kg) in one hour at one meter (39.37 inches) from the source, except systems that operate in excess of 500 kVp may have a leakage radiation at one meter (39.37 inches) from the source which does not exceed 0.1 percent of the useful beam one meter from the source.

(2) Permanent beam-limiting devices. Permanent fixed diaphragms or cones used for limiting the useful beam shall provide protection that is the same as or higher than that which is required for the tube housing assembly.

(3) Removable and adjustable beam-limiting devices.

(A) Removable beam-limiting devices shall, for the portion of the useful beam to be blocked by these devices, transmit not more than one percent of the useful beam at the maximum kilovoltage and maximum treatment filter. This requirement shall not apply to auxiliary blocks or materials placed in the useful beam to shape the useful beam to the individual patient.

(B) Adjustable beam limiting devices installed after May 31, 1989 shall meet the requirements of K.A.R. 28-35-249 (a)(3)(A).

(C) Adjustable beam limiting devices installed before May 31, 1989 shall, for the portion of the x-ray beam to be blocked by these devices, transmit not more than five percent of the useful beam at the maximum kilovoltage and maximum treatment filter.

(4) Filter system. The filter system shall be so designed that:

(A) the filters cannot be accidentally displaced at any possible tube orientation;

(B) the radiation at five centimeters (two inches) from the filter insertion slot opening does not exceed 30 roentgens (7.74 mC/kg) per hour under any operating conditions; and

(C) each filter is marked as to its material of construction and its thickness. For wedge filters, the wedge angle shall appear on the wedge or wedge tray.

(5) Tube immobilization. The tube housing assembly shall be capable of being immobilized for stationary treatments.

(6) Focal spot marking. The tube housing assembly shall be marked so that it is possible to determine the location of the focal spot to within five millimeters. The marking shall be readily accessible for use during calibration procedures.

(7) Beam block. Contact therapy tube housing assemblies shall have a removable shield of at least 0.5 millimeter lead equivalency of 100 kVp that can be positioned over the entire useful beam exit port during periods when the beam is not in use.

(8) Beam monitor system. Systems of greater than 150 kVp manufactured after May 31, 1989 shall be provided with a beam monitor system which:

(A) shall have the detector of the monitor system interlocked to prevent incorrect positioning;

(B) shall not allow irradiation until a preselected value of exposure has been made at the treatment control panel;

(C) shall independently terminate irradiation when the preselected exposure has been reached;

(D) shall be so designed that, in the event of a system malfunction or electrical power failure, the dose administered to a patient prior to the system malfunction or power failure can be accurately determined;

(E) shall have a display at the control panel from which the dose at a reference point in soft tissue can be calculated;

(F) shall have a control panel display which maintains the administered dose reading until intentionally reset to zero; and

(G) shall have a control panel display which does not have scale multiplying factors and utilizes a design such that increasing dose is displayed by increasing numbers.

(9) Timer.

(A) A timer which has a display shall be provided at the treatment control panel. The timer shall have a preset time selector and an elapsed time indicator.

(B) The timer shall be a cumulative timer which is activated by the production of radiation and retains its reading after irradiation is interrupted or terminated. After irradiation is terminated and before irradiation can be reinitiated, it shall be necessary to reset the elapsed time indicator to zero.

(C) The timer shall terminate irradiation when a preselected time has elapsed if any dose monitoring system present has not previously terminated irradiation.

(D) The timer shall permit accurate presetting and determination of exposure times as short as one second.

(E) The timer shall not permit an exposure if set at zero.

(F) The timer shall not activate until the shutter is opened when irradiation is controlled by a shutter mechanism.

(10) Control panel functions. The control panel, in addition to the displays required in other provisions of this regulation, shall have:

(A) an indication of whether electrical power is available at the control panel and if activation of the x-ray tube is possible;

(B) an indication of whether x-rays are being produced;

(C) means for indicating x-ray tube potential and current;

(D) means for terminating an exposure at any time;

(E) a locking device which will prevent unauthorized use of the x-ray system; and

(F) for x-ray systems manufactured after May 31, 1989, a positive display of the specific filter or filters in the beam.

(11) Multiple tubes. When a control panel is capable of energizing more than one x-ray tube:

(A) the control panel shall be designed so that it is possible to activate only one x-ray tube at any time;

(B) the control panel shall indicate which x-ray tube is energized; and

(C) there shall be an indication at or near the tube housing assembly when that tube is energized.

(12) Source-to-skin distance. The system shall have a means of determining the SSD to within one centimeter (0.4 inches).

(13) Shutters. Unless it is possible to bring the x-ray output to the prescribed exposure parameter within five seconds, the beam shall be automatically attenuated by a shutter having a lead equivalency which is not less than that of the tube housing assembly. After the unit is at operating parameters:

(A) the shutter shall be controlled electrically by the operator from the control panel; and

(B) an indication of shutter position shall appear at the control panel.

(14) Low-filtration x-ray tubes. Each x-ray system shall have a clear label on the tube housing assembly and at the control panel stating the device is equipped with a beryllium or low-filtration window.

(b) Facility design requirements for x-ray systems capable of operating above 50 kVp.

(1) Aural communication. Provisions shall be made for two-way aural communication between the patient and the operator at the control panel. However, where excessive noise levels or treatment requirements make aural communication impractical, other methods of communication shall be used.

(2) Viewing systems.

(A) Windows, mirrors, closed-circuit television, or an equivalent system shall be provided to permit continuous observation of the patient during irradiation and shall be so located that the operator can observe the patient from the control panel.

(B) When the primary viewing system is by electronic means, an alternate viewing system, which may be electronic, shall be available for use in the event of failure of the primary viewing system.

(3) Additional requirements for x-ray systems capable of operation above 150 kVp.

(A) All protective barriers shall be permanently fixed except for entrance doors or beam interceptors.

(B) The control panel shall be located outside the treatment room.

(C) Entrance interlocks. Interlocks shall be provided that require all entrance doors to be closed before treatment can be initiated or continued. If the radiation beam is interrupted by any door opening, it shall not be possible to restore the machine to operation without closing the door and reinitiating irradiation by manual action at the control panel.

(D) When any door referred to in K.A.R. 28-35-249 (b)(3)(C) is opened while the x-ray tube is activated, the exposure at a distance of one meter from the source shall be reduced to less than 100 milliroentgens (25.8 uC/kg) per hour.

(c) Surveys, calibrations, spot checks, and operating procedures.

(1) Surveys.

(A) Each new facility, and each existing facility that has not previously been surveyed, shall be surveyed by, or under the direction of, a qualified expert. In addition, a survey shall be done after any change in a facility or in equipment of a facility which might cause a significant increase in radiation hazard.

(B) The registrant shall obtain a written report of the survey from the qualified expert, and a copy of the report shall be transmitted by the registrant to the department within 30 days of receipt of the report.

(C) The survey and report shall indicate all instances where the facility, in the opinion of the qualified expert, is in violation of applicable regulations.

(2) Calibrations.

(A) The calibration of an x-ray system shall be performed at intervals not to exceed one year, and also after any change or replacement of components which could cause a change in the radiation output.

(B) The calibration of the radiation output of the x-ray system shall be performed by, or under the direction of, a qualified expert who is physically present at the facility during the calibration.

(C) Calibration of the radiation output of an x-ray system shall be performed with a calibrated dosimetry system. The calibration of the system shall be traceable to a national standard. Each dosimetry system shall have been calibrated within the preceding two years.

(D) The calibrations shall be such that the dose at a reference point in soft tissue can be calculated to within an uncertainty of five percent.

(E) The calibration of the x-ray system shall include at least the following determinations:

(i) verification that the x-ray system is operating in compliance with the design specifications:

(ii) the exposure rates as a function of field size, technique factors, filter, and treatment distance used;

(iii) the degree of congruence between the radiation field and the field indicated by the localizing device if such a device is present; and

(iv) an evaluation of the uniformity of the largest radiation field used.

(F) Records of calibration shall be maintained by the registrant for five years after completion of the calibration.

(G) A copy of the most recent x-ray system calibration shall be available at or in the area of the control panel.

(3) Spot checks. Spot checks shall be performed on each x-ray system capable of operation at greater than 150 kVp. Each spot check and spot check procedures shall meet the following requirements.

(A) The spot-check procedures shall be in writing and shall have been developed by a qualified expert. A copy of the procedures shall be submitted to the department prior to its implementation.

(B) The results of any spot-check measurement not performed by a qualified expert shall be reviewed by a qualified expert within 15 days.

(C) The spot-check procedures shall specify the frequency at which each test or measurement is to be performed. The spot-check procedures shall specify that the spot-check shall be performed during the calibration specified in K.A.R. 28-35-249 (c)(2). The acceptable tolerance for each parameter measured in the spot-check when compared to the value for that parameter determined in the calibration specified in K.A.R. 28-35-249 (c)(2) shall be stated.

(D) The cause for a parameter exceeding a tolerance set by the qualified expert shall be investigated and corrected before the system is used for patient irradiation.

(E) Whenever a spot-check indicates a significant change in the operating characteristics of a system, as specified in the qualified expert's spot-check procedures, the system shall be recalibrated as required in K.A.R. 28-35-249 (c)(2).

(F) A record of each spot-check measurement shall be maintained by the registrant for two years after completion of both spot-check measurements or completion of any necessary corrective actions.

(G) Where a spot-check involves a radiation measurement, the measurement shall be obtained using a system that either satisfies the requirements of K.A.R. 28-35-249 (c)(2) or has been intercompared with a system meeting those requirements within the previous year.

(4) Operating procedures.

(A) X-ray systems shall not be left unattended unless the system is secured against unauthorized use.

(B) When a patient must be held in position for radiation therapy, mechanical supporting or restraining devices shall be used.

(C) The tube housing assembly shall not be hand-held during operation unless the system is designed to require such holding and the peak tube potential of the system does not exceed 50 kVp. In such cases, the holder shall wear protective gloves and an apron of not less than 0.5 mm lead equivalency at 100 kVp.

(D) No individual other than the patient shall be in the treatment room during exposures from x-ray systems operating at or below 150 kVp unless that individual is protected by a barrier sufficient to meet the requirements of K.A.R. 28-35-212a. No individual other than the patient shall be in the treatment room during exposures from x-ray systems operating above 150 kVp.

(E) An x-ray system shall not be used in the administration of radiation therapy unless the requirements of K.A.R. 28-35-249 (c)(2) and K.A.R. 28-35-249 (c)(3)(F) have been met. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended Sept. 20, 1993.)

28-35-250. (Authorized by K.S.A. 1975 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; revoked Sept. 20, 1993.)

28-35-250a. **X-ray and electron therapy systems with energies of one MeV and above.** K.A.R. 28-35-308 through 28-35-319, except K.A.R. 28-35-318 (C) and K.A.R. 28-35-318 (D), shall apply to medical facilities using therapy systems with energies of one MeV and above.

(a) Requirements for equipment beam quality and leakage.

(1) Leakage radiation to the patient area.

(A) New equipment shall meet the following requirements.

(i) For operating conditions producing maximum leakage radiation, the absorbed dose in rads, or grays, due to leakage radiation, including x-rays, electrons, and neutrons, at any point in a circular plane of two meters (6.4 feet) radius centered on and perpendicular to the central axis of the beam at the isocenter or normal treatment distance and outside the maximum useful beam size, shall not exceed 0.1 percent of the maximum absorbed dose in rads, or grays, of the unattenuated useful beam as measured at the point of intersection of the central axis of the beam and the plane surface. Measurements, excluding those for neutrons, shall be averaged over an area up to, but not exceeding, 100 square centimeters (15.5 square inches) at the positions specified. Measurements of the portion of the leakage radiation dose contributed by neutrons shall be averaged over an area up to, but not exceeding, 200 square centimeters (31 square inches).

(ii) For each system, the registrant shall determine or obtain from the manufacturer the leakage radiation existing at the positions specified in K.A.R. 28-35-250a (a)(1)(A) for the specified operating conditions. Records on leakage radiation measurements shall be maintained for inspection by the department.

(B) Existing equipment shall meet the following requirements.

(i) For operating conditions producing maximum leakage radiation, the absorbed dose in rads (grays) due to leakage radiation, excluding neutrons, at any point in a circular plane of two meters (6.4 feet) radius centered on and perpendicular to the central axis of the beam at one meter (39.37 inches) from the virtual source, and outside the maximum size useful beam, shall not exceed 0.1 percent of the maximum absorbed dose in rads (grays) of the unattenuated useful beam as measured at the point of intersection of the central axis of the beam and the surface of the circular plane. Measurements shall be averaged over an area up to, but not exceeding, 100 square centimeters (15.5 square inches) at the positions specified.

(ii) For each system, the registrant shall determine or obtain from the manufacturer the leakage radiation existing at the positions specified in K.A.R. 28-35-250a(a)(1)(B)(i) for the specified operating conditions. Records on radiation leakage shall be maintained for inspection by the department.

(2) Leakage radiation outside the patient area for new equipment.

(A) The absorbed dose in rads (grays) due to leakage radiation, except in the area specified in K.A.R. 28-35-250a (a)(1)(A)(i), when measured at

any point one meter (39.37 inches) from the path of the charged particle, before the charged particle strikes the target or window, shall not exceed 0.1 percent for x-ray leakage, nor 0.05 percent for neutron leakage, of the maximum absorbed dose in rads (grays) of the unattenuated useful beam as measured at the point of intersection of the central axis of the beam and the circular plane specified in K.A.R. 28-35-250a (a)(1)(A)(i).

(B) Each registrant shall determine or obtain from the manufacturer the actual leakage radiation existing at the positions specified in K.A.R. 28-35-250a (a)(2)(A) for specified operating conditions. Radiation measurements, excluding neutrons, shall be averaged over an area up to, but not exceeding, 100 square centimeters (15.5 square inches). Neutron measurements shall be averaged over an area up to but not exceeding 200 square centimeters (31 square inches).

(3) Beam-limiting devices. Adjustable or interchangeable beam-limiting devices shall be provided and such devices shall transmit not more than two percent of the useful beam at the normal treatment distance for the portion of the useful beam which is to be attenuated by the beam-limiting device. The neutron component of the useful beam shall not be included in this requirement.

(4) Beam symmetry. In new equipment inherently capable of producing useful beams with asymmetry exceeding five percent, the asymmetry of the radiation beam in two orthogonal directions shall be monitored before the beam passes through the beam-limiting device. The system shall be designed so that:

(A) the control panel will indicate if the difference in dose rate between one region and another region symmetrically displaced from the central axis of the beam exceeds five percent of the central axis dose rate; and

(B) the irradiation is automatically terminated if the difference in dose rate exceeds 10 percent.

(5) Beam quality. Each registrant shall determine, or obtain from the manufacturer, data sufficient to assure that the following beam quality requirements are met.

(A) The absorbed dose resulting from x-rays in a useful electron beam at a point on the central axis of the beam 10 centimeters greater than the practical range of the electrons shall not exceed the values stated in table III. Linear interpolation shall be used for any values not stated.

Table III

Maximum energy of electron beam in MeV	X-ray absorbed dose as a fraction of maximum absorbed dose
1	0.03
15	0.05
35	0.10
50	0.20

(B) Compliance with K.A.R. 28-35-250a (a)(5)(A) shall be determined using:

(i) a measurement within a phantom with the incident surface of the phantom at the normal treatment distance and normal to the central axis of the beam;

(ii) the largest field size available which does not exceed 15 by 15 centimeters (5.9 by 5.9 inches); and

(iii) a phantom whose cross-sectional dimensions exceed the measurement radiation field by at least five centimeters (two inches) and whose depth is sufficient to perform the required measurement.

(C) The absorbed dose at a surface located at the normal treatment distance, at the point of intersection of that surface with the central axis of the useful beam during x-ray irradiation, shall not exceed the limits stated in table IV. Linear interpolation shall be used for any values not stated.

Table IV

Maximum photon energy in MeV	Absorbed dose at the surface as a fraction of the maximum absorbed dose
1	0.80
2	0.70
5	0.60
15	0.50
35	0.40
50	0.20

(D) Compliance with K.A.R. 28-35-250a (a)(5)(C) shall be determined by measurements made:

(i) within a phantom using an instrument which will allow extrapolation to the absorbed dose at the surface;

(ii) using a phantom with a size and placement which meets the requirements of K.A.R. 28-35-250a (a)(5)(B);

(iii) after removal of all beam-modifying devices which can be removed without the use of tools, except for beam-scattering or beam-flattening filters; and

(iv) using the largest field size available which does not exceed 15 by 15 centimeters (5.9 by 5.9 inches).

(E) Each registrant shall determine, or obtain from the manufacturer, the maximum percentage absorbed dose in the useful beam due to neutrons, excluding stray neutron radiation, for specified operating conditions.

(6) Absorbed dose rate. New equipment shall include a system that provides readings from which the absorbed dose rate at a reference point in the treatment volume can be calculated. In addition:

(A) The dose monitor unit rate shall be displayed at the treatment control panel.

(B) If the equipment can deliver under any conditions an absorbed dose rate at the normal treatment distance which is more than twice the maximum value specified by the manufacturer for any machine parameters utilized, a device shall be provided which terminates irradiation when the absorbed dose rate exceeds a value twice the specified maximum. The value at which the irradiation will be terminated shall be identified in a record maintained by the registrant.

(7) Location of virtual source and beam orientation. Each registrant shall determine, or obtain from the manufacturer, the location with reference to an accessible point on the radiation head of:

(A) the x-ray target or the virtual source of x-rays; and

(B) the electron window or the virtual source of electrons, if the system has electron beam capabilities.

(b) Operational requirements for equipment.

(1) Beam monitors. Each therapy system shall be provided with a beam monitoring system in the radiation head. The beam monitoring system in new equipment shall be provided with at least two radiation detectors which shall be incorporated into two separate dose monitoring systems. Existing equipment shall be provided with at least one radiation detector which shall be incorporated into a primary dose monitoring system. Each detector and system shall meet the following requirements.

(A) Each detector shall be removable only with tools and shall be interlocked to prevent incorrect positioning.

(B) Each detector shall form part of a dose monitoring system from whose readings, in dose monitor units, the absorbed dose at a reference point in the treatment volume can be calculated.

(C) Each dose monitoring system shall be capable of independently monitoring, interrupting, and terminating irradiation.

(D) The dose monitoring system in new equipment shall be designed to assure that:

(i) The malfunctioning of one system will not affect the correct functioning of the second system; and

(ii) The failure of any element common to both systems which could affect the correct function of both systems will terminate irradiation.

(E) Each dose monitoring system shall have a legible display at the treatment control panel. Each display on new equipment shall:

(i) maintain a reading until intentionally reset to zero;

(ii) have only one scale and no scale multiplying factors;

(iii) utilize a design that displays an increasing dose by increasing numbers, and in the event of an overdosage of radiation, accurately determines the absorbed dose; and

(iv) provide, in the event of power failure, a means for retrieving the dose monitoring information required in K.A.R. 28-35-250a (b)(1)(E) that was displayed at the control panel at the time of failure. The ability to retrieve the dose monitoring information shall be available in at least one system for a 20-minute period of time following the loss of power.

(2) Selection and display of dose monitor units.

(A) Irradiation shall not be possible until the number of dose monitor units has been selected at the treatment control panel.

(B) The pre-selected number of dose monitor units shall be displayed at the treatment control panel until reset manually for the next irradiation.

(C) The dose monitor unit shall be designed so that, after irradiation terminates, the dosimeter display must be reset to zero before subsequent treatment can be initiated.

(D) New equipment shall be designed so that, after irradiation terminates, the preselected dose monitor units must be manually reset before irradiation can be initiated.

(3) Filters.

(A) Each filter which is removable from the system shall be clearly marked with an identification number. Documentation available at the control panel shall contain a description of the filter. For wedge filters, the wedge angle shall appear on the wedge or wedge tray.

(B) If the absorbed dose rate data required by K.A.R. 28-35-250a (a)(6) is calculated exclusively under operation with a field-flattening or beam-scattering filter in place, the filter shall be removable only by the use of tools.

(C) For new equipment which utilizes a system of wedge filters, interchangeable field-flattening filters, or interchangeable beam-scattering filters:

(i) irradiation shall not be possible until a selection of a filter has been made at the treatment control panel;

(ii) an interlock system shall be provided to prevent irradiation if the filter selected is not in the correct position;

(iii) a display shall be provided at the treatment control panel showing the filter or filters in use; and

(iv) an interlock shall be provided to prevent irradiation if any filter selection operation carried out in the treatment room does not agree with the filter selection operation carried out at the treatment control panel.

(4) Termination of irradiation by the dose monitoring system or systems during stationary beam therapy.

(A) Each primary system shall terminate irradiation when the preselected number of dose monitor units has been detected by the system.

(B) If original design of the equipment included a second dose monitoring system, that system shall be capable of terminating irradiation when the second system detects not more than 15 percent or 40 dose monitor units above the preselected number of dose monitor units set at the control panel.

(C) For new equipment, a second dose monitoring system shall be present. That system shall be capable of terminating irradiation when it detects not more than 10 percent or 25 dose monitoring units above the preselected number of dose monitor units set at the control.

(D) An indicator on the control panel for new equipment shall show which dose monitoring system has terminated irradiation.

(5) Interruption switches. It shall be possible to interrupt irradiation and equipment movements at any time from the operator's position at the treatment control panel. Following an interruption, it shall be possible to restart irradiation by operator action without any reselection of operating conditions. If any change is made of a preselected value during an interruption, irradiation and equipment movements shall be automatically terminated.

(6) Termination switches. It shall be possible to terminate irradiation and equipment movements, or go from an interruption condition to a termination condition, at any time from the operator's position at the treatment control panel.

(7) Timer.

(A) A timer which has a display shall be provided at the treatment control panel. The timer shall have a preset time selector and an elapsed time indicator.

(B) The timer shall be a cumulative timer which activates with the production of radiation and retains its reading after irradiation is interrupted or terminated. After irradiation is terminated and before radiation can be reinitiated, it shall be necessary to reset the elapsed time indicator to zero.

(C) New equipment shall be designed so that, after termination of irradiation and before irradiation can be reinitiated, the present time selector must be manually reset.

(D) The timer shall terminate irradiation when a preselected time has elapsed if the dose monitoring systems have not previously terminated irradiation.

(8) Selection of radiation type. Equipment capable of both x-ray therapy and electron therapy shall meet the following additional requirements:

(A) Irradiation shall not be possible until a selection of radiation type has been made at the treatment control panel.

(B) An interlock system shall be provided to insure that the equipment can emit only the radiation type which has been selected.

(C) An interlock system shall be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel.

(D) An interlock system shall be provided to prevent irradiation with x-rays except to obtain a port film when electron applicators are fitted.

(E) An interlock system shall be provided to prevent irradiation with electrons when accessories specific for x-ray therapy are fitted.

(F) The radiation type selected shall be displayed at the treatment control panel before and during irradiation.

(9) Selection of energy. Equipment capable of generating radiation beams of different energies shall meet the following requirements.

(A) Irradiation shall not be possible until a selection of energy has been made at the treatment control panel.

(B) An interlock system shall be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel.

(C) The normal energy value selected shall be displayed at the treatment control panel before and during irradiation.

(D) For new equipment, an interlock system shall be provided to terminate irradiation if the energy of the electrons striking the x-ray target or electron window deviates by more than 20 percent of three MeV, whichever is smaller, from the selected nominal energy.

(10) Selection of stationary beam therapy or moving beam therapy. Equipment capable of both stationary beam therapy and moving beam therapy shall meet the following requirements.

(A) Irradiation shall not be possible until a selection of stationary beam therapy or moving beam therapy has been made at the treatment control panel.

(B) An interlock system shall be provided to insure that the equipment can operate only in the mode which has been selected.

(C) An interlock system shall be provided to prevent irradiation if any selected operations carried out in the treatment room do not agree with the selected operations carried out at the treatment control panel.

(D) The mode of operation shall be displayed at the treatment control panel.

(E) For new equipment, an interlock system shall be provided to terminate irradiation if:

(i) movement of the gantry occurs during stationary beam therapy; or

(ii) movement of the gantry stops during moving beam therapy unless such stoppage is a preplanned function.

(F) Moving beam therapy shall be controlled to obtain the selected relationships between incremental dose monitor units and the incremental angle of movement.

(i) For new equipment, an interlock system shall be provided to terminate irradiation if the number of dose monitor units delivered in any 10 degrees of arc differs by more than 20 percent from the selected value.

(ii) For new equipment, where the gantry angle terminates the irradiation in arc therapy, the dose monitor units shall differ by less than five percent from the value calculated from the absorbed dose per unit angle of relationship.

(G) Where the dose monitor system terminates the irradiation in arc therapy, the termination of irradiation shall function as required by K.A.R. 28-35-250a (b)(4).

(11) System checking facilities. Each system shall be designed so that all radiation safety interlocks can be checked for correct operation. When preselection of any operating condition requires action in the treatment room and at the treatment control panel, selection at one location shall not give a display at the other location until the requisite selected operations in both locations have been completed.

(c) Facility and shielding requirements. In addition to the requirements of K.A.R. 28-35-212a, 28-35-214a, 28-35-217a, 28-35-291a, 28-35-220a, 28-35-229a, 28-35-230a and 28-35-231a of these regulations, the following facility and shielding design requirements shall apply.

(1) Protective barriers. Each protective barrier shall be fixed except for entrance doors or beam interceptors.

(2) Control panel. The control panel shall be located outside the treatment room.

(3) Viewing systems.

(A) Windows, mirrors, closed-circuit television, or an equivalent system shall be provided to permit continuous observation of the patient during irradiation and shall be located so that the operator may observe the patient from the control panel.

(B) When the primary viewing system is by electronic means, an alternate viewing system, which may be electronic, shall be available for use in the event of failure of the primary viewing system.

(4) Aural communications. Provisions shall be made for two-way aural communication between the patient and the operator at the control panel. However, where excessive noise levels or treatment requirements makes aural communication impractical, other methods of communication shall be used.

(5) Room entrances. Each treatment room shall be provided with warning lights in readily observable positions near the outside of all access doors to indicate when the useful beam is ''on.''

(6) Entrance interlocks. Interlocks shall be provided that require all entrance doors to be closed before treatment can be initiated or con-

tinued. If the radiation beam is interrupted by any door opening, it shall not be possible to restore the machine to operation without first closing the door and then reinitiating irradiation by manual action at the control panel.

(d) Surveys.

(1) Each new facility, and each existing facility that has not previously been surveyed, shall be surveyed by, or under the direction of, a qualified expert. In addition, a survey shall be done after any change in a facility or in equipment of a facility which might cause a significant increase in radiation hazard.

(2) The registrant shall obtain a written report of the survey from the qualified expert, and a copy of the report shall be transmitted by the registrant to the department within 30 days of receipt of the report.

(3) The survey and report shall indicate all instances where the installation of radiographic equipment, in the opinion of the qualified expert, is in violation of applicable regulations.

(e) Calibrations.

(1) The calibration of systems subject to K.A.R. 28-35-250a shall be performed in accordance with an established calibration protocol, acceptable to the department, before the system is first used for irradiation of a patient, and thereafter at time intervals which do not exceed 12 months. Calibration shall also be performed after any change which might significantly alter the calibration, spatial distribution, or other characteristics of the therapy beam. The calibration protocol published by the American association of physicists in medicine may be used as an established protocol. For other protocols, the user shall submit that protocol to the department for concurrence that the protocol is acceptable.

(2) The calibration shall be performed under the direct supervision of a radiological physicist who is physically present at the facility during the calibration.

(3) Calibration radiation measurements required by K.A.R. 28-35-250a (e)(1) shall be performed using a dosimetry system:

(A) having a calibration factor for cobalt-60 gamma rays traceable to a national standard;

(B) which has been calibrated within the previous two years as well as after any servicing that may have affected its calibration;

(C) which has been calibrated in such a fashion that an uncertainty can be stated for the radiation quantities monitored by the system; and

(D) which has had constancy checks performed on the system as specified by a radiological physicist.

(4) Calibrations shall be conducted in sufficient detail that the dose at a reference point in soft tissue may be calculated to within an uncertainty of five percent.

(5) The calibrations of the therapy beam shall include at least the following determinations:

(A) verification that the equipment is operating in compliance with the design specifications:

(i) the light localizer, side light, and backpointer alignment with the isocenter when applicable;

(ii) variation in the axis of rotation for the table, gantry, jaw system; and

(iii) beam flatness and symmetry at the specified depth;

(B) measurement of the absorbed dose rate at various depths of water for the range of field sizes used, for each effective energy, that will verify the accuracy of the dosimetry of all therapy procedures utilized with that therapy beam;

(C) verification of the uniformity of the radiation field and any dependency upon the direction of the useful beam;

(D) verification that existing depth-dose data and isodose charts applicable to the specific machine continue to be valid or are updated to existing machine conditions;

(E) verification of transmission and electron buildup factors for all accessories including wedges, shadow trays, and compensators.

(6) A record of each calibration measurement under K.A.R. 28-35-250a (e)(1) and each dosimetry system calibration under K.A.R. 28-35-250a (e)(3) shall be maintained for five years after completion of the full calibration.

(7) A copy of the latest calibration performed pursuant to K.A.R. 28-35-250a (e)(1) shall be available in the area of the control panel.

(f) Spot-checks. Spot-checks shall be performed on each system subject to K.A.R. 28-35-250a during and thereafter at intervals not to exceed one month. Such spot-checks shall meet the following requirements.

(1) The spot-check procedures shall be in writing and shall have been developed by a radiological physicist. A copy of the procedure shall be submitted to the department prior to its implementation.

(2) The results of any spot-check measurements not performed by a radiological physicist

shall be reviewed by a radiological physicist within 15 days.

(3) The spot-check procedures shall specify the frequency at which each test or measurement is to be performed and the acceptable tolerance for each parameter as measured in the spot-check when compared to the value for that parameter determined in the calibration.

(4) At intervals not to exceed one week, spot-checks shall be made of absorbed dose measurements at a minimum of two depths in a phantom.

(5) Where a system has built-in devices which provide a measurement of any parameter during irradiation, that measurement shall not be utilized as a spot-check measurement.

(6) The cause for a parameter exceeding a tolerance set by the radiological physicist shall be investigated and corrected before the system is used for patient irradiation.

(7) Whenever a spot-check indicates a significant change in the operation characteristics of a system, as specified in the radiological physicist's spot-check procedures, the system shall be recalibrated as required in K.A.R. 28-35-250a (e).

(8) A record of each spot-check and any necessary corrective actions shall be maintained by the registrant for a period of two years after completion of the spot-check measurements or any necessary corrective action that is taken.

(9) Where a spot-check involves a radiation measurement, the measurement shall be obtained using a system that either satisfies the requirements of K.A.R. 28-35-250a (e)(1) or has been intercompared with a system meeting those requirements within the previous year.

(g) Operating procedures. A system shall not be used in the administration of radiation therapy unless the requirements of K.A.R. 28-35-250a (c), (d), and (f) have been met. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-251. **Veterinary medicine radiographic installation.** (a) Equipment.

(1) Diaphragms or cones shall be provided for collimating the useful beam to the area of clinical interest.

(2) A device shall be provided to terminate the exposure at a preset time.

(3) A dead-man type of exposure switch shall be provided, together with an electrical cord of sufficient length so that the operator can stand out of the useful beam and at least two meters (six feet) from the animal during all x-ray exposures.

(b) Structural shielding. All wall, ceiling, and floor areas shall be equivalent to, or provided with, applicable protective barriers as required in section K.A.R. 28-35-242 (e).

(c) Operating procedures.

(1) The operator shall stand well away from the useful beam and the animal during radiographic exposures.

(2) No individual other than the operator shall be in the x-ray room while exposures are being made unless such individual's assistance is required.

(3) When an animal must be held in position during radiography, mechanical supporting or restraining devices shall be used if practical. If the animal must be held by an individual, that individual shall be protected with appropriate shielding devices, protective gloves and apron, and shall be so positioned that no part of the holder's body will be struck by the useful beam. The thickness of the shielding device used shall be the same as that required under K.A.R. 28-35-242 (d)(6) and (7). The exposure of any individual who consistently assists with restraining animals shall be monitored. (Authorized by K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended Sept. 20, 1993.)

Appendix A

28-35-252. X-ray film developing.

Time Temperature Chart

Thermometer Readings (Degrees)		*Minimum Developing Times (Minutes)*
C	F	
27	80	2
	79	2
	78	2½
	77	2½
24	76	3
	75	3
	74	3½
	73	3½
22	72	4
	71	4
	70	4½
	69	4½
20	68	5
	67	5½
	66	5½
	65	6
18	64	6½
	63	7

	Thermometer Readings (Degrees)	*Minimum Developing Times (Minutes)*
	62	8
	61	8½
16	60	9½

Processing of Film

(A) All films shall be processed in such a fashion as to achieve adequate sensitometric performance. This criterion shall be adjudged to have been met if either of the following items can be met. (1) Film or developer manufacturers published recommendations as regards time and temperature are followed, or

(2) Each film shall be developed in accord with the above time-temperature chart.

(B) *Manual processing of film.* (1) Devices shall be available which will: (a) Give the actual temperature of the developer and (b) Give an audible or visible signal, after a preset time (in minutes of duration). (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-253. **Appendix B; information on radiation shielding required for plan reviews.** In order for the department to provide an evaluation, technical advice, and official approval on shielding requirements for a radiation installation, the following information shall be submitted:

(a) A floor plan that shows, at a minimum, the following:

(1) (A) The normal location of the x-ray system's radiation port or diagnostic tube housing;

(B) the port or diagnostic tube housing's travel and traverse limits;

(C) the general directions of the useful beam;

(D) the location of any windows and doors;

(E) the location of the operator's booth; and

(F) the location of the x-ray control panel;

(2) the structural composition and thickness or lead equivalent of all walls, doors, partitions, floor, and ceiling of each room concerned;

(3) the dimensions of each room concerned; and

(4) the type of occupancy of each adjacent area, inclusive of space above and below the rooms concerned. If there is an exterior wall, the plan shall show the distance to the closest areas where it is likely that individuals may be present;

(b) the make and model of the x-ray equipment and the maximum technique factors;

(c) the type of examinations or treatments which will be performed with the equipment;

(d) information on the anticipated workload of the x-ray system or sytems; and

(e) a report of the recommendations of any qualified expert which may have computed the shielding requirements, including all basic assumptions used by the expert. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-254. **Appendix C; design requirements for an operator's booth.** (a) Space requirements.

(1) Each operator shall be allotted adequate room to operate the unit effectively.

(2) In determining whether the allotted space is adequate, any encumbrance by the x-ray control panel, overhang, cables, or other similar encroachments shall be expanded.

(3) The booth shall be located or constructed so that unattenuated direct scatter radiation originating on the examination table or at the wall cassette not reach the operator's station in the booth.

(b) Structural requirements. Shielding shall be provided to meet the requirements of K.A.R. 28-35-211a through 28-35-234a of these regulations.

(c) X-ray control placement. The x-ray control for the system shall be fixed within the booth.

(1) The operation of the x-ray devices shall only be possible from within the booth.

(2) The location of the control shall allow the operator to use the majority of the available viewing systems.

(d) Viewing system requirements.

(1) Each booth shall have at least one viewing device which is positioned so that:

(A) the operator can view the patient during any exposure; and

(B) the operator can have full view of any occupant of the room or of anyone who enters the room. If any door which allows access to the room cannot be seen from the booth, that door shall have an interlock control that prevents the exposure if the door is not closed.

(2) When the viewing system is a window, it shall have the same lead equivalence as that required for the booth's wall in which it is mounted.

(3) When the viewing system is by mirrors, the mirror or mirrors shall be positioned so that the general requirements of 28-35-254 (d)(1) are met.

(4) When the viewing system is by electronic means:

(A) the camera shall be positioned so that the general requirements of 28-35-254 (d)(1) are met; and

(B) there shall be an alternate viewing system as a backup for the primary system. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-255. **Appendix D; information to be submitted by persons proposing to conduct healing arts screening.** Each person requesting that the department approve a healing arts screening program shall submit the following information and evaluation:

(a) the name and address of the applicant, and where applicable, the names and addresses of agents within this state;

(b) diseases or conditions for which the x-ray examinations are to be used in diagnoses;

(c) a detailed description of the x-ray examinations proposed in the screening program;

(d) a description of the population to be examined in the screening program, including age, sex, physical condition, and other appropriate information;

(e) an evaluation of any known alternate methods not involving ionizing radiation which could achieve the goals of the screening program and why these methods are not used instead of the x-ray examinations;

(f) an evaluation by a qualified expert of the x-ray system or sytems to be used in the screening program. The evaluation by the qualified expert shall show that each system does satisfy all requirements of these regulations;

(g) a description of the diagnostic film quality control program;

(h) a copy of the technique chart for the x-ray examination procedures to be used;

(i) the qualifications of each individual who will be operating each x-ray system;

(j) the qualifications of the individual who will be supervising the operators of the x-ray systems. The extent of supervision and the method of work performance evaluation shall be specified;

(k) the name and address of the individual who will interpret each radiograph;

(l) a description of all procedures to be used in advising each individual screened and their private practitioner of the healing arts of the results of the screening procedure and any further medical needs indicated; and

(m) a description of all procedures for the retention or disposition of the radiographs and other records pertaining to each x-ray examination. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-256 to 28-35-260. **Reserved.**

PART 6.—USE OF SEALED RADIOACTIVE SOURCES IN THE HEALING ARTS

28-35-261. **Persons required to meet the requirements of this part.** The provisions of this part apply to all licensees who use sealed sources in medicine or veterinary medicine, and are in addition to, and not in substitution for, other applicable provisions of these regulations. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-262. **Interstitial, intracavatary, and superficial applications.** (a) Accountability, storage and transit.

(1) Except as otherwise specifically authorized by the department, each licensee shall keep a record of the issue and return of all sealed sources to their place of storage.

(2) Each licensee shall conduct a quarterly physical inventory to account for all sources and devices received and possessed. Records of the inventories shall be maintained for inspection by the department and shall include the quantities and kinds of radioactive material, location of sources and devices, and the date of the inventory.

(3) Each licensee shall follow the radiation safety and handling instructions approved by the department, and furnished by the manufacturer on the label attached to the source, device or permanent container thereof, or in the leaflet or brochure which accompanies the source or device. Each licensee shall maintain the instructions in a legible and conveniently available form.

(4) Each licensee shall assure that needles or standard medical applicator cells containing radium-226, or cobalt-60 as wire, are not opened while in the licensee's possession, unless specifically authorized by the department.

(b) Testing sealed sources for leakage and contamination.

(1) All sealed sources containing more than 100 microcuries of radioactive material with a half-life greater than 30 days, except iridium-192 seeds encased in nylon ribbon, shall be tested for contamination and leakage. The tests shall be con-

ducted at intervals not to exceed six months or at other intervals that are approved by the department, and described by the manufacturer on the label attached to the source, device, or permanent container thereof, or in the leaflet or brochure which accompanies the source or device. Each source or device shall be tested prior to its first use unless the supplier furnishes a certificate that the source or device has been tested within six months of such use.

(2) Leak tests shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample, except that in the case of radium, the test shall be capable of detecting the escape of radon at the rate of 0.001 microcurie per 24 hours. The test sample shall be taken from the source or from the surfaces of the device in which the source is mounted or stored.

(3) Leak test results shall be recorded in units of microcuries and maintained for inspection by the department.

(4) If any leak test conducted pursuant to subsection (b)(1) reveals the presence of 0.005 microcurie or more of removable contamination, or in the case of radium, the escape of radon at a rate equal to or greater than 0.001 microcurie per 24 hours, the licensee shall immediately withdraw the source from use and cause it to be decontaminated and repaired or to be disposed of in accordance with department regulations. A report shall be filed with the department, within five days of the test. The report shall describe the equipment involved, state the test results, and indicate the corrective action taken.

(c) Radiation surveys.

(1) The maximum radiation level at a distance of one meter from the patient in whom brachytherapy sources have been inserted shall be determined by measurement and calculation. This radiation level shall be entered on the patient's chart and on signs as required under subsection (d) of this rule and regulation.

(2) The radiation levels in the patient's room and the surrounding area shall be determined, recorded, and maintained for inspection by the department.

(3) The licensee shall require that patients treated with cobalt-60, cesium-137, iridium-192, or radium-226 implants remain hospitalized until a source count and a radiation survey of the patient confirm that all implants have been removed.

(d) Signs and records.

(1) In addition to the requirements of K.A.R. 28-35-219a, and amendments to that rule and regulation, the bed and cubicle or room of each brachytherapy patient of a hospital shall be marked with a sign indicating the presence of brachytherapy sources. This sign shall incorporate the radiation symbol and specify that radionuclide, the activity, date, and the individual or individuals to contact for radiation safety instructions.

(2) The following information shall be included on the patient's chart:

(A) The radionuclide administered, number of sources, activity in millicuries and time and date of administration;

(B) the exposure rate at one meter from the source, the time the determination was made, and by whom;

(C) the radiation symbol; and

(D) the precautionary instructions necessary to assure that the exposure of individuals does not exceed that permitted under K.A.R. 28-35-212a, and amendments to that rule and regulation. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-263. **Teletherapy.** (a) Equipment.

(1) The housing shall be constructed so that, at one meter from the source, the maximum exposure rate does not exceed 10 milliroentgens per hour when the beam control mechanism is in the ''off'' position. The average dose rate measured at a representative number of points about the housing, each at one meter from the source, shall not exceed two milliroentgens per hour.

(2) Certification shall be obtained from the manufacturer or distributor that the leakage radiation measured at one meter from the source, when the beam control mechanism is on the ''on'' position, does not exceed the larger of one roentgen per hour or 0.1 percent of the useful beam.

(3) Adjustable or removable beam-defining diaphragms shall allow transmission of not more than five percent of the useful beam exposure rate.

(4) Each beam control mechanism shall be of a positive design, capable of acting in any position of the housing. In addition, each beam control mechanism shall have an automatic closing device and shall be designed so that it can be returned

manually to the ''off'' position with a minimum risk of exposure.

(5) Each closing device shall be designed to return automatically to the ''off'' position in the event of any breakdown or interruption of the activating force and to stay in the ''off'' position until activated from the control panel.

(6) When any door to the treatment room is opened, the beam control mechanism shall, automatically and rapidly, restore the unit to the ''off'' position and cause it to remain there until the unit is reactivated from the control panel.

(7) There shall be, at the housing and at the control panel, a warning device that plainly indicates whether the beam is on or off.

(8) All equipment shall be provided with a locking device to prevent unauthorized use.

(9) Each control panel shall be provided with a timer that automatically terminates the exposure after a preset time.

(10) Each source shall be tested for leakage and contamination in accordance with K.A.R 28-35-262(b), and amendments to that rule and regulation. The tests for leakage may be made by wiping accessible surfaces of the housing port or collimator while the source is in the ''off '' position and measuring these wipes for transferred contamination.

(b) Shielding.

(1) Primary protective barriers shall be provided for any area that the useful beam may strike when using the largest possible diaphragm opening. The barriers shall extend at least one foot beyond the useful beam for any possible orientation.

(2) Secondary protective barriers shall be provided for all occupied areas exposed to leakage or scattered radiation.

(3) Provision shall be made to permit continuous observation of patients during irradiation.

(c) Operation.

(1) No individual who is occupationally exposed to radiation shall be in the treatment room during irradiation unless that individual is the patient.

(2) No individual, other than the patient, shall be in the treatment room, except when clinically necessary.

(d) Calibration measurements.

(1) Full calibration measurements shall be performed by licensees on each teletherapy unit:

(A) Prior to the first use of the unit for treating humans;

(B) prior to treating humans;

(i) whenever spot-check measurements indicate that the output value differs by more than 5 percent from the value obtained at the last full calibration corrected mathematically for physical decay;

(ii) following replacement of the radiation source or following reinstallation of the teletherapy unit in a new location; and

(iii) following any repair of the teletherapy unit that includes removal of the source or major repair of the components associated with the source exposure assembly; and

(C) at intervals not exceeding one year.

(2) Full calibration measurements shall include determinations of:

(A) The exposure rate or dose rate to an accuracy within plus or minus three percent for the range of field of distances, or for the axis distance used in radiation therapy;

(B) the congruence between the radiation field and the field indicated by the light beam localizing device;

(C) the uniformity of the radiation field and its dependence upon the orientation of the useful beam;

(D) timer accuracy; and

(E) the accuracy of all distance measuring devices used for treating humans.

(3) Full calibration measurements shall be made in accordance with the procedures recommended by the scientific committee on radiation dosimetry of the American association of physicists in medicine as prescribed in Physics in Medicine and Biology, Vol. 16, No. 3, 1971, pp. 379-396.

(4) The exposure rate or dose rate values shall be corrected mathematically for physical decay for intervals not exceeding one month.

(5) Full calibration measurements and physical decay corrections shall be performed by an expert who meets the requirements prescribed in K.A.R. 28-35-135(aa), and amendments to that rule and regulation.

(6) Full calibration measurements shall be performed using a dosimetry system that has been calibrated in accordance with standards approved by the department. The dosimetry system shall have been calibrated within the previous two years and after any servicing that may have affected system calibration.

(e) Spot check.

(1) Spot check measurements shall be performed at intervals not exceeding one month.

(2) Spot check measurements shall include determinations of:

(A) Timer accuracy;

(B) the congruence between the radiation field and the field indicated by the light beam localizing device;

(C) the accuracy of all distance measuring devices used for treating humans;

(D) the exposure rate, dose rate, or a quantity related in a known manner to these rates for one typical set of operating conditions; and

(E) the difference between the measurement made in paragraph (e)(2)(D) and the anticipated output, expressed as a percentage of the anticipated output.

(3) Spot check measurements shall be performed by an expert who meets the requirements prescribed in K.A.R. 28-35-135(aa), and amendments to that rule and regulation.

(4) Spot check measurements shall be performed using a dosimetry system that has been calibrated in accordance with subsection (d)(6) or by using a dosimetry system used solely for spot check measurements, calibrated by direct intercomparison with a system that has been calibrated in accordance with subsection (d)(6). This alternative calibration method shall have been performed within the previous one year and after each servicing that may have affected system calibration. Dosimetry systems calibrated by this alternative method shall not be used for full calibration measurements. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-264 to 28-35-272. **Reserved.**

PART 7.—SPECIAL REQUIREMENTS FOR INDUSTRIAL RADIOGRAPHIC OPERATIONS

28-35-273. (Authorized by K.S.A. 48-1607; effective Jan. 1, 1970; revoked, T-85-43, Dec. 19, 1984; revoked May 1, 1985.)

28-35-274. **Applicability of this part.** (a) The regulations in this part shall apply to all persons who utilize sources of radiation for industrial radiography, except those persons who are licensed or registered in the state of Kansas to engage in the practice of the healing arts, dentistry, podiatry, or veterinary medicine. The requirements of this part shall be in addition to, and not in substitution for, other requirements of these regulations.

(b) The requirements of K.A.R. 28-35-275, 28-35-277, 28-35-279, 28-35-280, and 28-35-287 shall apply to sealed radioactive sources only. The requirements of the other regulations of this part shall apply to both radiation machines and sealed radioactive sources. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-275. **Limits on levels of radiation for radiographic exposure devices and storage containers.** Radiographic exposure devices measuring less than four inches from the sealed source storage position to any exterior surface of the device shall have no radiation level in excess of 50 milliroentgens per hour at six inches from any exterior surface of the device. Radiographic exposure devices measuring four or more inches from the sealed source storage position to any exterior surface of the device, and all storage containers for sealed sources or outer containers for radiographic exposure devices, shall have no radiation level in excess of 200 milliroentgens per hour at any exterior surface, or in excess of 10 milliroentgens per hour at one meter from any exterior surface. The radiation level emanating from a device or container shall be measured with the sealed source in the shielded position. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-276. **Locking sources of radiation.** (a) Each source of radiation shall be provided with a lock, or an outer-locked container designed to prevent unauthorized or accidental exposure. Each source shall be kept locked at all times, except when under the direct surveillance of a radiographer or radiographer's trainee, or as may be otherwise authorized under K.A.R. 28-35-285. Each storage container and source changer shall be provided with a lock and shall be kept locked when containing sealed sources, except when the container is under the direct surveillance of a radiographer or radiographer's trainee.

(b) Prior to being moved from one location to another and also prior to being secured at a given location. Each radiographic exposure device, source changer, and storage container, shall be locked and the sealed source placed in the shielded position. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1,

1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-277. **Storage precautions.** Locked radiographic exposure devices, storage containers and source changers shall be physically secured to prevent tampering or removal by unauthorized personnel. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-278. **Radiation survey instruments.** (a) Each licensee or registrant shall maintain calibrated and operable radiation survey instruments to make physical radiation surveys as required by this part. The instrumentation required by this subsection shall have a range capable of measuring two milliroentgens per hour to one roentgen per hour, inclusive.

(b) Each radiation survey instrument shall be calibrated:

(1) At energies appropriate for use;

(2) at intervals not to exceed three months and after each instrument servicing;

(3) such that accuracy within plus or minus 20 percent can be demonstrated; and

(4) at two or more widely separated points, other than zero, on each scale.

(c) Records shall be maintained of these calibrations for two years after the calibration date. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-279. **Leak testing, repair, tagging, opening, modification and replacement of sealed sources.** (a) The replacement of any sealed source fastened to, or contained in, a radiographic exposure device, leak testing, repair, tagging, opening, or any other action involving a sealed source shall be performed only by persons specifically authorized to do so by the department, the United States nuclear regulatory commission, or an agreement state.

(b) Each sealed source shall be tested for leakage at intervals not to exceed six months. In the absence of a certificate from a transferor that a leak test has been made within the six month period prior to transfer, the sealed source shall not be put into use until leak tested.

(c) The leak test shall be capable of detecting the presence of 0.005 microcuries of removable contamination. Leak tests shall be made by wiping appropriate accessible surfaces and measuring the level of transferred contamination on the wipes. Records of leak test results shall be kept in units of microcuries and maintained for a period of two years.

(d) If any leak test reveals the presence of 0.005 microcuries or more of removable radioactive material, it shall be conclusively presumed that the sealed source is leaking. The licensee shall immediately withdraw the equipment involved from use and shall cause it to be decontaminated and repaired, or to be disposed of, in accordance with regulations of the department. Within five days after obtaining results of any leak test, the licensee shall file a report with the department describing the equipment involved, the test results, and the corrective action taken, if any.

(e) Any sealed source which is not fastened to, or contained in, a radiographic exposure device shall have permanently attached to it a durable tag, at least one inch square, bearing the radiation symbol described in K.A.R. 28-35-219a and, at least, the instructions: ''Danger—Radioactive Material—Do Not Handle—Notify Civil Authorities If Found.'' (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-280. **Quarterly inventory.** Each licensee shall conduct a quarterly inventory to account for all radioactive material sources received or possessed by the licensee. The records of the inventories shall be maintained for a period of two years following the date of the inventory, and shall include the quantities and kinds of radioactive material inventoried, the location of radioactive material sources at the time of inventory, and the date the inventory was conducted. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-281. **Utilization logs.** Each licensee or registrant shall maintain a log for each source of radiation which shall contain the following information:

(a) The make and model number, or a detailed description, of the source of radiation or storage container to which the log pertains;

(b) the name of the radiographer to whom the source or container is assigned;

(c) the plant or site where the source or container is used;

(d) the date or dates when the source or container is used; and

(e) the voltage, current, and exposure time for each radiographic exposure made with a radiation machine. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-282. **Limitations.** (a) A licensee or registrant shall not permit any person to act as a radiographer, until that person:

(1) Has been instructed in each subject listed in K.A.R. 28-35-289;

(2) has received a copy of and been given instructions regarding each regulation contained in this part, the applicable sections of Part 4 and Part 10, the license or licenses issued to the licensee, and the licensee's or registrant's operating and emergency procedures;

(3) has demonstrated the competence to use the source of radiation, any related handling tool, and survey instrument which is employed in the person's assignment; and

(4) has demonstrated comprehension of each matter referenced in this subsection, by successfully completing a written test and a field examination on each of those subjects. The test and field examination shall be reviewed and approved by the secretary.

(b) A licensee or registrant shall not permit any person to act as a radiographer's trainee until that person:

(1) Has received a copy of and been given instructions regarding the licensee's or registrant's operating and emergency procedures;

(2) has demonstrated the competence to use, under the personal supervision of a radiographer, the source of radiation, any related handling tool, and any radiation survey instrument which is employed in the person's assignment; and

(3) has demonstrated comprehension of each matter referenced in this subsection by successfully completing a written or oral test and a field examination on each of those subjects. The test and examination shall be reviewed and approved by the secretary.

(c) When a radiographer's trainee uses any radiographic exposure device, sealed source or related source handling tool, or when any such trainee conducts any of the radiation surveys required by K.A.R. 28-35-287(b) and (c) to determine that a sealed source has returned to the shielded position after an exposure, the radiographer's trainee shall be under the personal supervision of a radiographer. This personal supervision shall include:

(1) The radiographer's personal presence at the site where any sealed source is being used;

(2) the ability of the radiographer to give immediate assistance, if required; and

(3) actual surveillance by the radiographer of the trainee's performance of any operation referred to in this subsection.

(d) Each licensee or registrant shall conduct an internal audit program to ensure that the agency's radioactive material license conditions and the licensee's or registrant's operating and emergency procedures are followed by each radiographer and radiographer's trainee. These internal audits shall be performed at least quarterly, and each radiographer shall be audited at least quarterly. A record of each internal audit shall be maintained for inspection by the department for two years from the date of the audit. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-283. **Operating and emergency procedures.** The operating and emergency procedures of each licensee or registrant shall include instructions in at least the following areas:

(a) Proper and authorized handling and use of sources of radiation;

(b) methods of, and occasions for, conducting radiation surveys;

(c) methods of controlling access to areas where radiography is being performed;

(d) methods of, and occasions for, locking and securing sources of radiation;

(e) personnel monitoring and the use of personnel monitoring equipment, including steps that must be taken immediately by radiography personnel in the event a pocket dosimeter is found to be off-scale;

(f) transporting sources of radiation to field locations, including packing sources of radiation in a vehicle, posting of a vehicle in which a source of radiation is to be transported, and control of sources of radiation during transportation;

(g) procedures for minimizing exposure of individuals in the event of an accident;

(h) procedures for notifying proper persons in the event of an accident;

(i) maintenance of records; and

(j) inspection and maintenance of radiographic exposure devices and storage containers. (Author-

ized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-284. **Personal monitoring control.** (a) A licensee or registrant shall not permit any individual to act as a radiographer or a radiographer's trainee unless, at all times during radiographic operations, the individual is wearing a film or TLD badge and a pocket dosimeter. Each pocket dosimeter shall be capable of measuring doses ranging from zero to at least 200 milliroentgens. Each film or TLD badge shall be assigned to, and worn by, only one individual.

(b) Each pocket dosimeter shall be read and the dose shown by the reading shall be recorded daily. An individual's film or TLD badge shall be processed immediately if a pocket dosimeter is discharged beyond its range. Each film or TLD badge report received from the film badge processor, and a record of each pocket dosimeter reading, shall be maintained for inspection by the department.

(c) Each pocket dosimeter shall be checked, at intervals not exceeding one year, for correct response to radiation. An acceptable dosimeter shall read within plus or minus 30 percent of the true radiation exposure. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-285. **Security.** During each radiographic operation, the radiographer or radiographer's trainee shall maintain direct surveillance of the operation to protect against unauthorized entry into the high radiation area, except:

(a) When the high radiation area is equipped with a control device or an alarm system as described in K.A.R. 28-35-219a; or

(b) when the high radiation area is locked to protect against unauthorized or accidental entry. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-286. **Posting.** Any area in which radiography is being performed shall be conspicuously posted in the manner required by K.A.R. 28-35-219a. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-287. **Radiation surveys and survey records.** (a) No radiographic operation shall be conducted unless calibrated and operable radiation survey instruments, as described in K.A.R. 28-35-278, are available and used at each site where radiographic exposures are made.

(b) A survey, with a radiation survey instrument, shall be made after each radiographic exposure to determine that the sealed source has been returned to its shielded position. The entire circumference of the radiographic exposure device shall be surveyed. If the radiographic exposure device has a source guide tube, the survey shall include the guide tube.

(c) Prior to securing in a storage area any radiographic exposure device, storage container or source changer in the manner required by K.A.R. 28-35-276, a survey, with a radiation survey instrument, shall be made to determine that each sealed source is in the shielded position.

(d) A record shall be kept of each survey performed to comply with this rule and regulation.

(e) (1) The licensee shall check for obvious defects in each radiographic exposure device, storage container, and source changer prior to use each day the equipment is used.

(2) The licensee shall conduct a program for inspection and maintenance of each radiographic exposure device, storage container, and source changer at an interval not to exceed three months, or prior to the first use after three months from a previous inspection, to assure proper functioning of the device, especially the components concerning radiation safety. All parts of each device shall be maintained in accordance with the manufacturer's specifications. A record of inspection and maintenance shall be maintained until the department authorizes the disposal of the record.

(3) If any inspection conducted pursuant to paragraph (1) or (2) of this subsection reveals damage to any component of the device concerning radiation safety, the device shall not be used until fully repaired. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended Jan. 1, 1972; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-288. **Special requirements and exemptions for enclosed radiography.** (a)

Each system for enclosed radiography that is designed to allow admittance of any individual, shall:

(1) comply with all applicable requirements of this part and K.A.R. 28-35-214a if it is not a certified cabinet x-ray system;

(2) comply with all applicable requirements of this part and 21 CFR 1020.40, as in effect on April 30, 1984 if it is a certified cabinet x-ray system; and

(3) be evaluated, at intervals not to exceed one year, to assure compliance with the applicable requirements specified in paragraphs (1) or (2). A record of each evaluation shall be maintained for a period of two years after the evaluation.

(b) Each cabinet x-ray system designed to exclude any individual shall be exempt from the requirements of K.A.R. 28-35-274, 28-35-276; 28-35-278; 28-35-281; 28-35-282; 28-35-283; 28-35-284; 28-35-285; 28-35-286; 28-35-288; and 28-35-289 with the following exceptions.

(1) Operating personnel shall be provided with either a film badge or a thermoluminescent dosimeter. A report of each film badge or TLD analysis shall be made, and the results shall be maintained for inspection by the department.

(2) A registrant shall not permit any individual to operate a cabinet x-ray system until that individual has received a copy of and instruction in the operating procedures for the unit and has demonstrated competence in its use. A record which demonstrates compliance with this paragraph shall be maintained for inspection by the department until disposition is authorized by the department.

(3) A test for proper operation of each high radiation area control device or alarm system, where applicable, shall be conducted and recorded in accordance with K.A.R. 28-35-288(e).

(4) Each registrant shall perform an evaluation, at an interval not to exceed one year, to determine compliance with K.A.R. 28-35-214a. If such a system is a certified cabinet x-ray system, it shall be evaluated at an interval not to exceed one year to determine compliance with 21 CFR 1020.40, as in effect on April 30, 1984. Records of these evaluations shall be maintained for inspection by the department for a period of two years after the evaluation.

(c) Each certified cabinet x-ray system shall be maintained in compliance with 21 CFR 1020.40, as in effect on April 30, 1984, unless otherwise specified pursuant to K.A.R. 28-35-140(a).

(d) Each permanent radiographic installation having any high radiation area entrance control of the type described in K.A.R. 28-35-220a shall also meet the following requirements.

(1) Each entrance that is used for personnel access to the high radiation area in a permanent radiographic installation shall have both a visible and an audible warning signal to warn of the presence of radiation.

(2) The visible signal shall be activated by radiation whenever the source is exposed. The audible signal shall be activated when an attempt is made to enter the installation while the source is exposed.

(e) The control device or alarm system shall be tested for proper operation at the beginning of each period of use. A records of each test shall be prepared quarterly, or prior to the first use after the end of the quarter. Each record shall be maintained for inspection by the department until it authorizes their disposal. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Jan. 1, 1970; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Sept. 20, 1993.)

28-35-289. **The following subjects shall be included in training radiographers.** (a) Fundamentals of radiation safety.

(1) Characteristics of gamma and X-radiation;

(2) units of radiation dose (mrem) and quantity of radioactivity (curie);

(3) hazards of excessive exposure of radiation;

(4) levels of radiation from sources of radiation; and

(5) methods of controlling radiation dose;

(A) Working time;

(B) working distances; and

(C) shielding.

(b) Radiation detection instrumentation to be used.

(1) Use of radiation survey instruments;

(A) Operation;

(B) calibration; and

(C) limitations;

(2) survey techniques; and

(3) use of personnel monitoring equipment;

(A) Film or TLD badges; and

(B) pocket dosimeters.

(c) Radiographic equipment to be used.

(1) Remote handling equipment;

(2) radiographic exposure devices and sealed sources;

(3) storage containers; and

(4) operation and control of X-ray equipment.

(d) The requirements of federal and state regulations.

(e) The licensee's or registrant's written operating and emergency procedures.

(f) Case histories of radiography accidents. (Authorized by and implementing K.S.A. 1984 Supp. 48-1607; effective Jan. 1, 1970; amended May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-290. **Reports of incidents, lost or stolen sources.** (a) Each licensee shall provide a written report of all events involving radiography devices and licensed material as required pursuant to K.A.R. 28-35-184b, 28-35-228a, 28-35-229a, and 28-35-230a.

(b) In addition to the requirements in subsection (a), each licensee shall provide a written report to the department within 30 days of the occurrence of any of the following incidents involving radiographic equipment:

(1) Unintentional disconnection of the source assembly from the control cable;

(2) inability to retract the source assembly to its fully shielded position and secure it in this position; or

(3) failure of any component which is critical to safe operation of the device to perform its intended function.

(c) Each licensee shall include the following information in each report submitted under subsection (b):

(1) A description of the equipment problem;

(2) a description of the cause of each incident, if known;

(3) the name of the manufacturer and the model number of the equipment involved in the incident;

(4) the place, time and date of incident;

(5) a description of the actions taken to establish normal operations;

(6) a description of all corrective actions taken or planned to prevent reoccurrence; and

(7) a description of the qualifications of personnel involved in the incident.

(d) Each report of overexposure submitted pursuant to these regulations which involves failure of the safety components of radiography equipment shall also include the information specified in subsection (c). (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-291. **Performance requirements for radiography equipment.** (a) Each radiographic exposure device and all associated equipment shall meet the requirements specified in "Radiological Safety for Design and Construction of Apparatus for Gamma Radiography," published by the American national standards institute as NBS Handbook 136, issued January, 1981 (ANSI N432-1980 standards). As an alternative, any licensee or applicant may submit an engineering analysis demonstrating that testing previously performed on similar individual radiography components is adequate to support a finding that the previous testing is an acceptable substitute for that described in the N432-1980 standards.

(b) In addition to the requirements specified in K.A.R. 28-35-291 (a), each radiographic exposure device and associated equipment shall meet the following requirements.

(1) Each user of a radiographic exposure device shall attach to the device a durable, legible, clearly visible label bearing the following information:

(i) the chemical symbol and mass number of the radionuclide in the device;

(ii) the radioactive activity level and the date on which this activity was last measured;

(iii) the model number and serial number of the sealed source;

(iv) the manufacturer of the sealed source; and

(v) the licensee's name, address, and telephone number.

(2) Each radiographic exposure device intended for use as a type B transport container shall meet the applicable requirements of 10 CFR 71.51 adopted by the U.S. nuclear regulatory commission, as in effect on April 15, 1992.

(3) The licensee shall not modify any exposure device or associated equipment in a manner that would compromise the design safety features of the system.

(c) In addition to the requirements specified in K.A.R. 28-35-291 (a) and (b), each radiographic exposure device and associated equipment that allows the source to be moved out of the device for routine operation shall comply with the following requirements.

(1) The coupling between the source assembly and the control cable shall be designed so that the source assembly cannot become disconnected if cranked outside the guide tube. The coupling shall be designed to prevent an unintentional dis-

connection under normal and reasonably foreseeable abnormal conditions.

(2) The device shall automatically secure the source assembly when it is cranked back into the fully shielded position in the device. A deliberate operation on the exposure device shall be required to release the source assembly.

(3) The outlet fitting, lock box, and drive cable fittings on each radiographic exposure device shall be equipped with safety plugs or covers, which shall be installed during storage and transportation to protect the source assembly from water, mud, sand, or other foreign matter.

(4) Each sealed source or source assembly shall have attached to it or engraved on it a durable, legible, visible label with the words: ''DANGER RADIOACTIVE.'' The label shall not interfere with the safe operation of the exposure device or associated equipment.

(5) The guide tube shall have passed the crushing tests for the control tube as specified in ANSI N432-1980 standards and a kinking resistance test that closely approximates the kinking forces likely to be encountered during use.

(6) Guide tubes shall be used when moving the source out of the device.

(7) An exposure head or similar device shall be used to prevent the source assembly from passing out of the end of the guide tube during radiographic operations.

(8) The guide tube exposure head connection shall be able to withstand the tensile test for control units specified in ANSI N432-1980 standards.

(9) Each source changer shall provide a system for assuring that the source will not accidentally be withdrawn from the changer when connecting or disconnecting the drive cable to or from a source assembly.

(d) Each licensee shall only acquire newly manufactured radiographic exposure devices and associated equipment which complies with the requirements of this regulation after January 10, 1995.

(e) Each licensee shall only use radiographic exposure devices and associated equipment which complies with the requirements of this regulation after January 10, 1995.

(f) Any licensee may use equipment in industrial radiographic operations which does not comply with section 8.9.2(c) of the endurance test in ANSI N432-1980 standards, if prototype equipment has been tested using a torque that an individual using the radiography equipment can realistically exert on the lever or crankshaft of the drive mechanism. (Authorized by and implementing K.S.A. 48-1607; effective Nov. 1, 1996.)

28-35-292 to 28-35-295. **Reserved.**

PART 8.—RADIATION SAFETY REQUIREMENTS FOR ANALYTICAL X-RAY EQUIPMENT

28-35-296. **Purpose and scope.** This part provides special requirements for analytical x-ray equipment. The requirements of this part are in addition to, and not in substitution for applicable requirements in other parts of these regulations. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-297. **Equipment requirements.** (A) *Safety device.* A device which prevents the entry of any portion of an individual's body into the primary x-ray beam path or which causes the beam to be shut off upon entry into its path shall be provided on all open-beam configurations. A licensee and/or registrant may apply to the department for an exemption from the requirement of a safety device. Such application shall include: (1) a description of the various safety devices that have been evaluated, (2) the reason each of these devices cannot be used, and (3) a description of the alternative methods that will be employed to minimize the possibility of an accidental exposure, including procedures to assure that operators and others in the area will be informed of the absence of safety devices.

(B) *Warning devices.* Open-beam configurations shall be provided with a readily discernible indication of: (1) x-ray tube status (on-off) located near the radiation source housing, if the primary beam is controlled in this manner; and/or (2) Shutter status (open-closed) located near each port on the radiation source housing, if the primary beam is controlled in this manner. Warning devices shall be labeled so that their purpose is easily identified. On equipment installed after January 1, 1976, warning devices shall have fail-safe characteristics.

(C) *Ports.* Unused ports on radiation source housings shall be secured in the closed position in a manner which will prevent casual opening.

(D) *Labeling.* All analytical x-ray equipment shall be labeled with a readily discernible sign or signs bearing the radiation symbol and the words: (1) ''CAUTION—HIGH INTENSITY X-RAY BEAM,'' or words having a similar intent, on the x-ray source housing; (2) ''CAUTION RADIA-

TION—THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED,'' or words having a similar intent, near any switch that energizes an x-ray tube if the radiation source is an x-ray tube; or (3) ''CAUTION—RADIOACTIVE MATERIAL,'' or words having a similar intent, on the source housing if the radiation source is a radionuclide.

(E) *Shutters.* On open-beam configurations installed after January 1, 1976, each port on the radiation source housing shall be equipped with a shutter that cannot be opened unless a collimator or a coupling has been connected to the port.

(F) *Warning lights.* An easily visible warning light labeled with the words ''X-RAY ON,'' or words having a similar intent, shall be located: (1) near any switch that energizes an x-ray tube and shall be illuminated only when the tube is energized; or (2) in the case of a radioactive source, near any switch that opens a housing shutter, and shall be illuminated only when the shutter is open. On equipment installed after January 1, 1976, warning lights shall have fail-safe characteristics.

(G) *Radiation source housing.* Each x-ray tube housing shall be so constructed that with all shutters closed the leakage radiation measured at a distance of five (5) centimeters from its surface is not capable of producing a dose in excess of 2.5 millirem in one hour at any specified tube rating.

(H) *Generator cabinet.* Each x-ray generator shall be supplied with a protective cabinet which limits leakage radiation measured at a distance of five (5) centimeters from its surface such that it is not capable of producing a dose in excess of 0.25 millirem in one hour. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-298. **Area requirements.** (A) *Radiation levels.* The local components of an analytical x-ray system shall be located and arranged and shall include sufficient shielding or access control such that no radiation levels exist in any area surrounding the local component group which could result in a dose to an individual present therein in excess of the dose limits given in section 28-35-214 of these regulations. For systems utilizing x-ray tubes, these levels shall be met at any specified tube rating.

(B) *Surveys.* Radiation surveys, as required by 28-35-139 (A), of all analytical x-ray systems sufficient to show compliance with paragraph 28-35-298 (A) shall be performed: (1) Upon installation of the equipment;

(2) Following any change in the initial arrangement, number, or type of local components in the system;

(3) Following any maintenance requiring the disassembly or removal of a local component in the system;

(4) During the performance of maintenance and alignment procedures if the procedures require the presence of a primary x-ray beam when any local component in the system is disassembled or removed; and

(5) Any time a visual inspection of the local components in the system reveals an abnormal condition.

(6) Whenever personnel monitoring devices indicate doses above the appropriate limit established by 28-35-212. Radiation survey measurements shall not be required if a licensee and/or registrant can demonstrate compliance to the satisfaction of the department with 28-35-298 (A) in some other manner.

(C) *Posting.* Each area or room containing analytical x-ray equipment shall be conspicuously posted with a sign or signs bearing the radiation symbol and the words ''CAUTION—X-RAY EQUIPMENT,'' or words having a similar intent. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-299. **Operating requirements.** (A) *Procedures.* Normal operating procedures shall be written and available to all analytical x-ray equipment workers. No person shall be permitted to operate analytical x-ray equipment in any manner other than that specified in the procedures unless such person has obtained written approval of the radiation safety officer.

(B) *Bypassing.* No person shall bypass a safety device unless such person has obtained the approval of the radiation safety officer. When a safety device has been bypassed, a readily discernible sign bearing the words ''SAFETY DEVICE NOT WORKING,'' or words having a similar intent, shall be placed on the radiation source housing. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-300. **Personnel requirements.** (A) *Instruction.* No person shall be permitted to operate or maintain analytical x-ray equipment unless such person has received instruction in and demonstrated competence as to: (1) Identification of radiation hazards associated with the use of the equipment;

(2) Significance of the various radiation warning and safety devices incorporated into the equipment, or the reasons they have not been installed on certain pieces of equipment and the extra precautions required in such cases;

(3) Proper operating procedures for the equipment;

(4) Symptoms of an acute localized exposure; and

(5) Proper procedures for reporting an actual or suspected exposure.

(B) *Personnel Monitoring.* Finger or wrist dosimetric devices shall be provided to and shall be used by: (1) Analytical x-ray equipment workers using systems having an open-beam configuration and not equipped with a safety device; and

(2) Personnel maintaining analytical x-ray equipment if the maintenance procedures require the presence of a primary x-ray beam when any local component in the analytical x-ray system is disassembled or removed. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-301 to 28-35-307. **Reserved.**

PART 9.—RADIATION SAFETY REQUIREMENTS FOR PARTICLE ACCELERATORS

28-35-308. **Purpose and scope.** (A) This part establishes procedures for the registration and the use of particle accelerators.

(B) In addition to the requirements of this part, all registrants are subject to the requirements of part 1, 2, 4, and 10. Registrants engaged in industrial radiographic operations are subject to the requirements of part 7 and registrants engaged in the healing arts are subject to the requirements of part 5 and/or part 6 of these regulations. Registrants engaged in the production of radioactive material are subject to the requirements of part 3. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-309. **Registration requirements.** No person shall receive, possess, use, transfer, own, or acquire a particle accelerator except as authorized in a registration issued pursuant to these regulations or as otherwise provided for in these regulations. The general procedures for registration of particle accelerator facilities are included in part 2 of these regulations. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-310. **General requirements for the issuance of a registration for particle accelerators.** In addition to the requirements of part 2, the registrant shall: (A) Be qualified by reason of training and experience to use the accelerator in question for the purpose intended in accordance with this part and part 4 and part 10 of these regulations and in such a manner as to minimize danger to public health and safety or property;

(B) The registrant's proposed equipment, facilities, operating and emergency procedures shall be adequate to protect health and minimize danger to public health and safety or property;

(C) The use of the particle accelerator shall not be inimical to the health and safety of the public and the users shall satisfy any applicable special requirement in regulation 28-35-311 of this regulation;

(D) The registrant shall appoint a radiation safety officer;

(E) The registrant and/or his staff shall have subntial experience in the use of particle accelerators for the intended uses;

(F) The registrant shall establish a radiation safety committee to approve, in advance, proposals for uses of particle accelerators, whenever deemed necessary by the department; and

(G) The registrant shall have an adequate training program for particle accelerator operators. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-311. **Human use of particle accelerators.** In addition to the requirements set forth in part 2, the registrant shall: (A) Whenever deemed necessary by the department, the registrant shall appoint a medical committee of at least three (3) members to evaluate all proposals for research, diagnostic, and therapeutic use of a particle accelerator. Membership of the committee should include physicians expert in internal medicine, hematology, therapeutic radiology, and a person experienced in depth dose calculations and protection against radiation;

(B) The individuals designated as the users shall have substantial training and experience in deep therapy techniques or in the use of particle accelerations to treat humans; and

(C) The user must be a physician. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-312. **General provisions.** (A) This section establishes radiation safety requirements for the use of particle accelerators. The provisions of this section are in addition to, and not in substitution for, other applicable provisions of the regulations.

(B) The registrant shall be responsible for assuring that all requirements of this part are met. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 7, 1976.)

28-35-313. **Limitations.** (A) No registrant shall permit any person to act as a particle accelerator operator until such person: (1) Has been instructed in radiation safety and shall have demonstrated an understanding thereof;

(2) Has received copies of and instruction in this part and the applicable requirements of part 4 and part 10, pertinent operating conditions and the registrant's operating and emergency procedures, and shall have demonstrated understanding thereof; and

(3) Has demonstrated competence to use the particle accelerator, related equipment, and survey instruments which will be employed in his assignment.

(B) Either the radiation safety committee or the radiation safety officer shall have the authority to terminate the operations at a particle accelerator facility if such action is deemed necessary to protect health and minimize danger to public health and safety or property. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-314. **Shielding and safety design requirements.** (A) A qualified expert, specifically accepted by the department shall be consulted in the design of a particle accelerator installation and called upon to perform a radiation survey when the accelerator is first capable of producing radiation.

(B) Each particle accelerator installation shall be provided with such primary and/or secondary barriers as are necessary to assure compliance with sections 28-35-212 and 28-35-214. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-315. **Particle accelerator controls and interlock systems.** (A) Instrumentation, readouts and controls on the particle accelerator control console shall be clearly identified and easily discernible.

(B) All entrances into a target room or other high radiation area shall be provided with interlocks that shut down the machine under conditions of barrier penetration.

(C) When an interlock system has been tripped, it shall only be possible to resume operation of the accelerator by manually resetting controls at the position where the interlock has been tripped, and lastly at the main control console.

(D) Each safety interlock shall be on a circuit which shall allow its operation independently of all other safety interlocks.

(E) All safety interlocks shall be fail safe, *i.e.*, designed so that any defect or component failure in the interlock system prevents operation of the accelerator.

(F) A scram button or other emergency power cutoff switch shall be located and easily identifiable in all high radiation areas. Such a cutoff switch shall include a manual reset so that the accelerator cannot be restarted from the accelerator control console without resetting the cutoff switch. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-316. **Warning devices.** (A) All locations designated as high radiation areas, and entrances to such locations shall be equipped with easily observable flashing or rotating warning lights that operate when, and only when, radiation is being produced.

(B) Except in facilities designed for human exposure, each high radiation area shall have an audible warning device which shall be activated for fifteen (15) seconds prior to the possible creation of such high radiation area. Such warning device shall be clearly discernible in all high radiation areas and all radiation areas.

(C) Barriers, temporary or otherwise, and pathways leading to high radiation areas shall be identified in accordance with 28-35-219. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-317. **Operating procedures.** (A) Particle accelerators, when not in operation, shall be secured to prevent unauthorized use.

(B) Only a switch on the accelerator control console shall be routinely used to turn the accelerator beam on and off. The safety interlock system shall not be used to turn off the accelerator beam except in an emergency.

(C) All safety and warning devices, including interlocks, shall be checked for proper operability

at intervals not to exceed three (3) months. Results of such tests shall be maintained for inspection at the accelerator facility.

(D) Electrical circuit diagrams of the accelerator, and the associated interlock systems, shall be kept current and maintained for inspection by the department and available to the operator at each accelerator facility.

(E) If, for any reason, it is necessary to intentionally bypass a safety interlock or interlocks, such action shall be: (1) Authorized by the radiation safety committee and/or radiation safety officer; (2) recorded in a permanent log and a notice posted at the accelerator control console; and (3) terminated as soon as possible.

(F) A copy of the current operating and the emergency procedures shall be maintained at the accelerator control panel. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-318. **Radiation monitoring requirements.** (A) There shall be available at each particle accelerator facility, appropriate portable monitoring equipment which is operable and has been calibrated for the appropriate radiations being produced at the facility. Such equipment shall be tested for proper operation daily and calibrated at intervals not to exceed one (1) year, and after each servicing and repair.

(B) A radiation protection survey shall be performed and documented by a qualified expert specifically approved by the department when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas.

(C) Radiation levels in all high radiation areas shall be continuously monitored. The monitoring devices shall be electrically independent of the accelerator control and interlock systems and capable of providing a remote and local readout with visual and/or audible alarms at both the control panel and at entrance to high radiation areas, and other appropriate locations, so that people entering or present become aware of the existence of the hazard.

(D) All area monitors shall be calibrated quarterly.

(E) Whenever applicable, periodic surveys shall be made to determine the amount of airborne particulate radioactivity present in areas of airborne hazards.

(F) Whenever applicable, periodic smear surveys shall be made to determine the degree of contamination in target and other pertinent areas.

(G) All area surveys shall be made in accordance with the written procedures established by a qualified expert, or the radiation safety officer of the particle accelerator facility.

(H) Records of all radiation protection surveys, calibration results, instrumentation tests, and smear results shall be kept current and on file at each accelerator facility. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-319. **Ventilation systems.** (A) Adequate ventilation shall be provided in areas where airborne radioactivity may be produced.

(B) A registrant, as required by 28-35-215, shall not vent, release or otherwise discharge airborne radioactive material to an uncontrolled area which exceeds the limits specified in 28-35-232, appendix A, table II, except as authorized pursuant to 28-35-224 or 28-35-215 (B). For purposes of this paragraph, concentrations may be averaged over a period not greater than one (1) year. Every reasonable effort should be made to maintain releases of radioactive material to uncontrolled areas, as far below these limits as practicable. (Authorized by K.S.A. 1975 Supp. 48-1607; effective May 1, 1976.)

28-35-320 to 28-35-330. **Reserved.**

PART 10—NOTICES, INSTRUCTIONS AND REPORTS TO WORKERS; INSPECTIONS

28-35-331. **Persons required to meet the requirements of this part.** The requirements of this part apply to all persons who receive, possess, use, own or transfer material licensed by or registered with the department pursuant to part 2 or 3 of these regulations. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-332. **Posting of notices to workers.** (a) Each licensee or registrant shall post current copies of the following documents:

(1) The regulations in this part and part 4;

(2) the license, or certificate of registration, including any conditions on the license and any document or documents incorporated into the license by reference and also any amendment to the license;

(3) the operating procedures applicable to work under the license or registration; and

(4) any notice of violation involving radiological working conditions, any order issued pursuant to Part 1, and any response from the licensee or registrant.

(b) If the posting of a document specified in paragraph (a)(1), (2), or (3) is not practicable, the licensee or registrant may post a notice which describes the document and states where it may be examined.

(c) Department form RH-3 shall be posted by each licensee or registrant where individuals work in or frequent any portion of a controlled area.

(d) Documents, notices or forms shall be posted to allow individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

(e) Department documents posted pursuant to paragraph (a)(4) shall be posted within two working days after receipt of the documents from the department; the licensee's or registrant's response, if any, shall be posted within two working days after dispatch from the licensee or registrant. The documents shall remain posted for a minimum of five working days or until action correcting the violation has been completed, whichever is longer. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-333. **Instructions to workers.** (a) All individuals likely to receive an occupational dose:

(1) shall be kept informed of the storage, transfer, or use of radioactive material or of radiation in the restricted area;

(2) shall be instructed in the health protection problems associated with exposure to radioactive material or radiation to the individual and potential offspring, precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed;

(3) shall be instructed in, and instructed to observe, to the extent within the worker's control, the provisions of these regulations and of any licenses concerning the protection of personnel from exposures to radiation or radioactive material;

(4) shall be informed of their responsibility to report promptly to the licensee or registrant any condition which has caused or may cause a violation of the act, these regulations, or a condition of a license or which has caused or may cause unnecessary exposure to radiation or radioactive material;

(5) shall be instructed in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive material; and

(6) shall be informed of the radiation exposure reports which workers may request pursuant to K.A.R. 28-35-334, and any amendments to that rule and regulation.

(b) The extent of these instructions shall be commensurate with potential radiological health protection problems in the restricted area. (Authorized by K.S.A. 1993 Supp. 48-1607; implementing K.S.A. 1993 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Oct. 17, 1994.)

28-35-334. **Notifications and reports to individuals.** (a) Radiation exposure data for an individual and the results of any measurements, analyses, and calculations of radioactive material deposited or retained in the body of an individual shall be reported to the individual as specified in this section. The information reported shall include data and results obtained pursuant to the requirements of these regulations, any order of the secretary or license condition, as shown in records maintained by the licensee or registrant pursuant to K.A.R. 28-35-227h of these regulations. Each notification and report shall:

(1) Be in writing;

(2) include appropriate identifying data such as the name of the licensee or registrant, the name of the individual, and the individual's identification number, preferably social security number;

(3) include the individual's exposure information; and

(4) contain the following statement:

"This report is furnished to you under the provisions of Kansas Administrative Rule and Regulation 28-35-334. You should preserve this report for further reference."

(b) Each licensee or registrant shall furnish each worker annually a written report of the worker's dose as shown in records maintained by the licensee or registrant pursuant to K.A.R. 28-35-227h(b).

(c) Each licensee or registrant shall furnish to the worker a written report of the worker's exposure to sources of radiation or radioactive material at the request of a worker formerly engaged in activities controlled by the licensee or registrant. The report shall be furnished within 30 days from the date of the request, or within 30 days after the dose of the individual has been determined by the licensee or registrant, whichever is later. The report shall cover, within the period of time specified in the request, the dose record for each year the worker was required to be monitored pursuant to 28-35-217b of these regulations. The report shall also include the period of time in which the worker's activities involved exposure to sources of radiation and shall include the dates and locations of work under the license or registration in which the worker participated during this period.

(d) When a licensee or registrant is required pursuant to K.A.R. 28-35-229a(a)(1), and (b)(1) of these regulations to report to the department any exposure of an individual to sources of radiation, the licensee or the registrant shall also provide to the individual a written report of the individual's exposure data included in the report. These reports shall be transmitted at a time not later than the transmittal to the department.

(e) At the request of a worker who is terminating employment with the licensee or registrant that involves exposure to radiation or radioactive material, or at the request of a worker who, while employed by another person, is terminating assignment to work involving radiation dose in the licensee's facility, each licensee or registrant shall provide to the worker, or the worker's designee, a written report regarding the radiation dose received by that worker from operations of the licensee or registrant during the current year. The report shall be provided at the worker's termination. The licensee or registrant may provide a written estimate of that dose if the finally determined personnel monitoring results are not available at that time. Estimated doses shall be clearly indicated as such. (Authorized by K.S.A. 1993 Supp. 48-1607; implementing K.S.A. 1993 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985; amended Oct. 17, 1994.)

28-35-335. **Presence of representatives of licensees or registrants and workers during inspection.** (a) Each licensee or registrant shall afford to the department, at all reasonable times, opportunity to inspect materials, machines, activities, facilities, premises, and records maintained by the licensee or registrant.

(b) During an inspection, department inspectors may consult privately with workers as specified in K.A.R. 28-35-336 and any amendment to that rule and regulation. The licensee or registrant may accompany department inspectors during other phases of an inspection.

(c) If, at the time of inspection, an individual has been authorized by the workers to represent them during department inspections, the licensee shall give the workers' representative an opportunity to accompany the inspectors during the inspection of physical working conditions.

(d) Each workers' representative shall be routinely engaged in work under control of the licensee or registrant and shall have received the instructions specified in K.A.R. 28-35-333 and any amendment of that rule and regulation.

(e) Different representatives of licensees or registrants and workers may accompany the inspectors during different phases of an inspection if there is no resulting interference with the conduct of the inspection. However, only one workers' representative at a time shall accompany the inspectors.

(f) With the approval of the licensee or registrant and the workers' representative, an individual who is not routinely engaged in work under control of the licensee or registrant shall be afforded the opportunity to accompany department inspectors during the inspection of physical working conditions.

(g) Department inspectors may refuse to permit accompaniment by an individual who deliberately interferes with a fair and orderly inspection. If an area to be inspected is a restricted area, the workers' representative for that area shall be an individual previously authorized by the licensee or registrant to enter that area. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-336. **Consultation with workers during inspections.** (a) Department inspectors may consult privately with workers concerning matters of occupational radiation protection and other matters related to the provisions of these regulations or any condition of a license, to the

extent the inspectors deem necessary for the conduct of an effective and thorough inspection.

(b) During the course of an inspection, any worker may bring privately to the attention of the inspectors, either orally or in writing, any past or present condition which that worker has reason to believe may have contributed to or caused any violation of the act, these regulations, or any license condition, or any unnecessary exposure of an individual to radiation from licensed radioactive material or a registered radiation machine under the licensee's or registrant's control. Any such notice in writing shall state clearly the condition complained of and be signed by the worker.

(c) The provisions of 28-35-336 subsection (b) shall not be interpreted as authorizing disregard of instructions given pursuant to K.A.R. 28-35-333 and any amendments of that rule and regulation. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-337. **Requests by workers for inspections.** (a) Any worker or representative of workers who believes that a violation of the act, these regulations or a license conditions exists or has occurred in work under a license or registration with regard to radiological working conditions in which the worker is engaged may request an inspection by giving notice of the alleged violation to the department. Any such notice shall be in writing, shall set forth the specific grounds for the notice, and shall be signed by the worker or representative of the workers. A copy shall be provided to the licensee or registrant by the department no later than at the time of inspection except that, upon the request of the worker giving the notice, the worker's name and the name of individuals referred to shall not appear in the copy or on any record published, released, or made available by the department, except for good cause shown.

(b) If, upon receipt of the notice, the department determines that the complaint meets the requirements of subsection (a), and that there are reasonable grounds to believe that the alleged violation exists or has occurred, an inspection shall be made as soon as practicable, to determine if the alleged violation exists or has occurred. Inspections pursuant to this section need not be limited to matters referred to in the complaint.

(c) No licensee or registrant shall discharge or in any manner discriminate against any worker because the worker has filed any complaint, or instituted or caused to be instituted any proceeding under these regulations, or has testified or is about to testify in any proceeding, or because of the exercise by the worker on behalf of the worker or others of any option afforded by this part. (Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

28-35-338. **Inspections not warranted; informal review.** (a) If the department determines, with respect to a complaint filed under K.A.R. 28-35-337, and any amendments to that rule and regulation that an inspection is not warranted because there are no reasonable grounds to believe that a violation exists or has occurred, the department shall notify the complainant in writing of that determination. The complainant may obtain a review of the determination by submitting a written statement of position to the secretary, who will provide the licensee or registrant with a copy of the statement by certified mail, excluding, at the request of the complainant, the name of the complainant. The licensee or registrant may submit an opposing written statement of position to the secretary, who will provide the complainant with a copy of that statement by certified mail. Upon the request of the complainant, the secretary or the secretary's designee may hold an informal conference in which the complainant and the licensee or registrant may orally present their views. An informal conference may also be held at the request of the licensee or registrant, but disclosure of the identity of the complainant shall be made only following receipt of written authorization from the complainant. After considering all written or oral views presented, the secretary shall affirm, modify, or reverse the determination of the department and furnish the complainant and the licensee or registrant a written notification of the decision and the reason for the decision.

(b) If the secretary determines that an inspection is not warranted because the requirements of K.A.R. 28-35-337(a) have not been met, the secretary shall notify the complainant in writing of the determination. That determination shall be without prejudice to the filing of a new complaint meeting the requirements of K.A.R. 28-35-337(a).

(Authorized by K.S.A. 1984 Supp. 48-1607; implementing K.S.A. 1984 Supp. 48-1604, 48-1607, 48-1609; effective May 1, 1976; amended, T-85-43, Dec. 19, 1984; amended May 1, 1985.)

Part 11.—WIRELINE AND SUBSURFACE TRACER STUDIES

28-35-341. **Persons to whom these regulations apply.** The regulations in this part shall apply to each licensee or registrant who uses any source of radiation for wireline service operations, including mineral logging, radioactive markers, or subsurface tracer studies. The requirements of this part shall be in addition to, and not in substitution for, the requirements of Parts 1, 2, 3, 4, and 10 of these regulations. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20 1993.)

28-35-342. **Preoperational and use requirements.** (a) A license shall not perform any wireline service operation with a sealed source or sources unless, prior to commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor, or land owner stating that:

(1) if a sealed source is lodged downhole, a reasonable effort at recovery will be made; and

(2) if a decision is made to abandon the sealed source downhole, the requirements of K.A.R. 28-35-362 (c) shall be met.

(b) Limits on levels of radiation. Sources of radiation shall be used, stored, and transported in such a manner that the transportation and the dose limitation requirements of K.A.R. 28-35-211a through 28-35-234a of these regulations are met. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-343. **Storage precautions.** (a) Each source of radiation, except accelerators, shall be provided with a storage container, and if transported, a transport container. The same container may be used in both cases equipped if it meets the requirements for each use. The container shall be provided with a lock or tamper seal for calibration sources to prevent unauthorized removal of, or exposure to, the source of radiation.

(b) Each source of radiation shall be stored in a manner which will minimize danger from explosion or fire. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-344. **Transport precautions.** Each transport container shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-345. **Radiation survey instruments.** (a) Each licensee or registrant shall maintain a sufficient supply of calibrated and operable radiation survey instruments at each field station to make any physical radiation survey required by regulations K.A.R. 28-35-341 through 28-35-364 of these regulations. Instrumentation shall be capable of measuring a range of 0.1 milliroentgen (2.58×10^{-8} C/kg) per hour through at least 20 milliroentgens (5.16×10^{-6} C/kg) per hour. Instrumentation obtained after May 1, 1995 shall be capable of measuring a range of 0.1 milliroentgens (2.58×10^{-8} C/kg) through at least 50 milliroentgens (1.29×10^{-5} C/kg) per hour.

(b) Within the previous six months and after each servicing, each radiation survey instrument used shall be calibrated:

(1) at energies and radiation levels appropriate for use;

(2) so that accuracy within plus or minus 20 percent of the true radiation level can be demonstrated on each scale; and

(3)(A) at two points located approximately ⅓ and ⅔ of full-scale on each scale if it is a linear instrument;

(B) at midrange of each decade, and at two points of at least one decade if it is a logarithmic scale instrument; and

(C) at appropriate points if it is a digital instrument.

(c) A calibration record for each instrument shall be maintained for a period of two years for inspection by the department. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-346. **Leak testing of sealed sources.** (a) Requirements. Each licensee using any sealed source of radioactive material shall have the source tested for leakage. A record of leak test results shall be kept in units of microcuries and maintained for inspection by the department.

(b) Method of testing. Each test for leakage shall be performed only by a person specifically authorized to perform such a test by the department, the U.S. nuclear regulatory commission, an

agreement state, or a licensing state. The test sample shall be taken from the surface of the source, source holder, or from the surface of the device in which the source is stored or mounted and on which one might expect contamination to accumulate. The test sample shall be analyzed for radioactive contamination. The analysis shall be capable of detecting the presence of 0.005 microcurie (185 Bq) of radioactive material on the test sample.

(c) Interval of testing. Each sealed source of radioactive material shall be tested at an interval not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made prior to the transfer, the sealed source shall not be put into use until tested. If, for any reason, it is suspected that a sealed source may be leaking, it shall be removed from service immediately and tested for leakage as soon as practical.

(d) Leaking or contaminated sources. If the test reveals the presence of 0.005 microcurie (185 Bq) or more of leakage or contamination, the licensee shall immediately withdraw the source from use and shall cause it to be decontaminated, repaired, or disposed of in accordance with these regulations. A report describing the equipment involved, the test results, and the corrective action taken shall be filed with the department within five days of receiving the test results.

(e) Exemptions. The following sources shall be exempt from the periodic leak test requirements of this regulation:

(1) hydrogen-3 sources;

(2) sources of radioactive material with a half-life of not more than 30 days;

(3) sealed sources of radioactive material in gaseous form;

(4) sources of beta or beta-gamma or gamma-emitting radioactive material with an activity of not more than 100 microcuries (3.7 MBq); and

(5) sources of alpha-emitting radioactive material with an activity of not more than 10 microcuries (0.370 MBq). (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-347. **Quarterly inventory.** Each licensee or registrant shall conduct a physical inventory to account for all sources of radiation once every three months. A record of each inventory shall be maintained for two years from the date of the inventory for inspection by the department and shall include the quantities and kinds of sources of radiation, the location where sources of radiation are assigned, the date of the inventory, and the name of the individual conducting the inventory. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-348. **Utilization records.** Each licensee or registrant shall maintain current utilization records, which shall be kept available for inspection by the department for two years from the date of the recorded event, showing the following information for each source of radiation:

(a) make, model number, and a serial number or a description of each source of radiation used;

(b) the identity of the well-logging supervisor or field unit to whom assigned;

(c) each location where used and each date of use; and

(d) the radionuclide and activity used in a particular well, when dealing with tracer materials and radioactive markers. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-349. **Design, performance, and certification criteria for sealed sources used in downhole operations.** (a) Each sealed source, except those containing radioactive material in gaseous form, which is used in downhole operations and manufactured after May 1, 1991 shall be certified by the manufacturer, or other testing organization acceptable to the department, to meet the following minimum criteria.

(1) Each source shall be of doubly encapsulated construction.

(2) Each source shall contain radioactive material with a chemical and physical form which is insoluble and non-dispersible as practical.

(3) Each source shall have been individually pressure tested to at least 24,656 pounds per square inch absolute (170 MN/m2) without failure.

(b) Except for those sealed sources containing radioactive material in gaseous form, a sealed source acquired after May 1, 1992 shall not be put into use in the absence of a certificate from a transferor certifying that the sealed source meets the requirements of subsection (a) of this regulation, until required determinations and testing have been performed.

(c) Each sealed source, except a source containing radioactive material in gaseous form, which is used in downhole operations after May 1, 1992, shall be certified by the manufacturer, or

other testing organization acceptable to the department, as meeting the sealed source performance requirements for oil well-logging as contained in the American national standard N43.6, 1977, ''Classification of Sealed Radioactive Sources,'' (formerly N542, ANSI/NBS 126) in effect on May 1, 1991.

(d) Certification documents shall be maintained for inspection by the department for a period of two years after source disposal. If the source is abandoned downhole, the certification documents shall be maintained until the department authorizes disposition. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-350. **Labeling.** (a) Each source, source holder, or logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label, which has, as a minimum, the standard radiation caution symbol, without the conventional color requirement, and the following wording:

DANGER (or CAUTION)
RADIOACTIVE

This labeling shall be on the smallest component transported as a separate piece of equipment.

(b) Each transport container shall have permanently attached to it a durable, legible, and clearly visible label which has, as a minimum, the standard radiation caution symbol and the following wording:

DANGER (or CAUTION)
RADIOACTIVE
NOTIFY CIVIL AUTHORITIES
(OR NAME OF COMPANY)

(Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-351. **Repair, opening or modification.** (a) Each licensee or registrant shall conduct, at intervals not to exceed six months, a program of inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools to assure proper labeling and physical condition. A record of each inspection and maintenance operation shall be maintained for a period of two years for inspection by the department.

(b) If any inspection conducted pursuant to this regulation reveals damage to labeling or to a component critical to radiation safety, the device shall be removed from service until repairs have been made.

(c) If a sealed source is stuck in the source holder, the licensee shall not perform any operation, including drilling, cutting, or chiseling, on the source holder unless the licensee is specifically approved by the U.S. nuclear regulatory commission, an agreement state, or a licensing state to perform this operation.

(d) The repair, opening, or modification of any sealed source shall be performed only by a person specifically authorized to do so by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-352. **Training requirements.** (a) A licensee or registrant shall not permit any individual to act as a logging supervisor as defined in this part until that individual has:

(1) received, in a course recognized by the department, the U.S. nuclear regulatory commission, an agreement state, or a licensing state, instruction in each subject outlined in Appendix A of this part and demonstrated an understanding of the course material;

(2) read and received instruction in the regulations contained in this part and the applicable sections of Parts 1, 4, and 10 of these regulations or their equivalent, the conditions of the appropriate license or certificate of registration, and the licensee's or registrant's operating and emergency procedures, and demonstrated an understanding of these materials; and

(3) demonstrated competence to use sources of radiation, related handling tools, and radiation survey instruments which will be used on the job.

(b) A licensee or registrant shall not permit any individual to assist in the handling of sources of radiation until that individual has:

(1) read or received instruction in the licensee's or registrant's operating and emergency procedures and demonstrated an understanding of the procedures; and

(2) demonstrated competence to use, under the personal supervision of the logging supervisor, the sources of radiation, related handling tools, and radiation survey instruments which will be used on the job.

(c) Each licensee or registrant shall maintain training records for each employee for inspection by the department for two years following termi-

nation of employment. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-353. **Operating and emergency procedures.** Each licensee's or registrant's operating and emergency procedures shall include, at a minimum, instructions in the following:

(a) handling and use of sources of radiation;

(b) methods and occasions for conducting radiation surveys;

(c) methods and occasions for locking and securing sources of radiation;

(d) personnel monitoring and the use of personnel monitoring equipment;

(e) transportation to temporary jobsites and field stations, including the packaging and placing of sources of radiation in vehicles, placarding of vehicles, and securing sources of radiation during transportation;

(f) the actions to be taken to minimize exposure of individuals in the event of an accident;

(g) the procedure for notifying proper personnel in the event of an accident;

(h) maintenance of records;

(i) use, inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools;

(j) the procedure to be followed if a sealed source is lodged downhole;

(k) use of tracers, decontamination of the environment, equipment, and personnel; and

(l) actions to be taken if a sealed source is ruptured, including actions to prevent the spread of contamination and minimize inhalation and ingestion of radioactive material and actions to obtain suitable radiation survey instruments as required by K.A.R. 28-35-345. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-354. **Personnel monitoring.** A licensee or registrant shall not permit any individual to act as a logging supervisor or to assist in the handling of sources of radiation unless each individual wears either a film badge or a thermoluminescent dosimeter (TLD). Each film badge or TLD shall be assigned to and worn by only one individual. Film badges shall be replaced at least monthly and TLD's replaced at least quarterly. After replacement, each film badge or TLD shall be promptly processed. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-355. **Security.** During each logging or tracer application, the logging supervisor or other designated employee shall maintain direct surveillance of the operation to protect against unauthorized or unnecessary entry into a controlled area, as defined in Part 1 of these regulations. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-356. **Handling tools.** Each licensee shall provide and require the use of tools that will assure remote handling of sealed sources other than low activity calibration sources. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-357. **Subsurface tracer studies.** (a) Protective gloves and other appropriate protective clothing and equipment shall be used by all personnel handling radioactive tracer material. Precautions shall be taken to avoid ingestion or inhalation of radioactive material.

(b) A licensee shall not purposely cause the injection of radioactive material into potable aquifers. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-358. **Particle accelerators.** A licensee or registrant shall not permit aboveground testing of any particle accelerator, designed for use in well logging which results in the production of radiation, except in areas or facilities controlled or shielded so that the requirements of K.A.R. 28-35-212a and 28-35-214a of these regulations, as applicable, are met. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-359. **Radiation surveys.** (a) A radiation survey or calculation shall be made and recorded for each area where radioactive materials are stored.

(b) A radiation survey or calculation shall be made and recorded for the radiation levels in occupied positions and on the exterior of each vehicle used to transport radioactive material. The survey or calculation shall include each source of radiation or combination of sources to be transported in the vehicle.

(c) After removal of the sealed source from the logging tool and before departing the jobsite, the logging tool detector shall be energized, or a sur-

vey meter used, to assure that the logging tool is free of contamination.

(d) A radiation survey shall be made and recorded at the jobsite or well-head for each tracer operation, except those using hydrogen-3, carbon-14, and sulfur-35. The survey shall include measurements of radiation levels before and after the operation.

(e) Each record required pursuant to K.A.R. 28-35-359 (a) through (d) shall include the dates, the identification of the individual or individuals making the survey, the identification of the survey instrument or instruments used, and an exact description of the location of the survey. The record of each survey shall be maintained for inspection by the department for two years after completion of the survey. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-360. **Documents and records required to be maintained at field stations.** Each licensee or registrant shall maintain, for inspection by the department, the following documents and records for the specific devices and sources assigned to the field station:

(a) the appropriate license, certificate of registration, or equivalent document;

(b) operating and emergency procedures;

(c) applicable regulations;

(d) records of the latest survey instrument calibrations conducted pursuant to K.A.R. 28-35-345;

(e) records of the latest leak test results conducted pursuant to K.A.R. 28-35-346;

(f) quarterly inventories required pursuant to K.A.R. 28-35-347;

(g) utilization records required pursuant to K.A.R. 28-35-348;

(h) survey records required pursuant to K.A.R. 28-35-349;

(i) records of inspection and maintenance required pursuant to K.A.R. 28-35-351; and

(j) training records required pursuant to K.A.R. 28-35-352. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept 20, 1993.)

28-35-361. **Documents and records required at temporary jobsites.** Each licensee or registrant conducting operations at a temporary jobsite shall have the following documents and records available at that site for inspection by the department:

(a) operating and emergency procedures;

(b) survey records required pursuant to K.A.R. 28-35-359 for the period of operation at the site;

(c) evidence of current calibration for each radiation survey instrument in use at the site;

(d) when operating in the state under a reciprocity agreement, a copy of the appropriate license, certificate of registration, or equivalent documentation; and

(e) shipping papers for the transportation of radioactive material. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

28-35-362. **Notification of incidents, abandonment, and lost sources.** (a) The licensee shall notify the department of any incidents and sources lost in other than downhole logging operations in accordance with K.A.R. 28-35-184b, 28-35-228a, 28-35-229a and 28-35-230a.

(b) Whenever a sealed source or device containing radioactive material is lodged downhole, the licensee shall:

(1) monitor at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations; and

(2) notify the department immediately by telephone and subsequently, within 30 days, by confirmatory written report if the licensee knows or has reason to believe that a sealed source has been ruptured. This written report shall identify the well or other location, describe the magnitude and extent of the escape of radioactive material, assess the consequences of the rupture, and explain efforts planned or being taken to mitigate these consequences.

(c) If it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall comply with the following requirements.

(1) The licensee shall advise the well-operator of the following requirements regarding the method of abandonment:

(A) The well-operator shall immobilize and seal the radioactive source in place with a cement plug.

(B) The well-operator shall set in place a whipstock or other deflection device.

(C) The well-operator shall mount a permanent identification plaque at the surface of the

well, containing the appropriate information required by this regulation.

(2) The licensee shall notify the department by telephone, giving the circumstances of the loss, and request approval of the proposed abandonment procedures.

(3) The licensee shall file a written report with the department within 30 days of the abandonment, setting forth the following information:

(A) the date of occurrence and a brief description of attempts to recover the source;

(B) a description of the radioactive source involved, including the radionuclide, quantity, and chemical and physical form;

(C) a description of the surface location and identification of well;

(D) the results of efforts to immobilize and set the source in place;

(E) the depth of the radioactive source;

(F) the depth of the top of the cement plug;

(G) the depth of the well; and

(H) the information contained on the permanent identification plaque.

(d) Whenever a sealed source containing radioactive material is abandoned downhole, the licensee shall provide a permanent plaque as described in K.A.R. 28-35-364 for posting on the well or well-bore. The plaque shall:

(1) be constructed of long-lasting material, which may include stainless steel or monel; and

(2) contain the following information engraved on its face:

(A) the word ''CAUTION'';

(B) the radiation symbol, without the conventional color requirement;

(C) the date of abandonment;

(D) the name of the well operator or well owner;

(E) the well name and well identification number or numbers or other designation;

(F) a description of the sealed source or sources, by radionuclide and quantity of activity;

(G) the source depth and the depth to the top of the plug; and

(H) an appropriate warning which, depending on the specific circumstances of that abandonment, shall include:

(i) ''Do not drill below plug back depth'';

(ii) ''do not enlarge casing''; or

(iii) ''do not reenter the hole before contacting the Kansas department of health and environment radiation control program''; and

(3) be a minimum of seven inches square. The word caution shall be written in ½-inch letters and all other information shall be written in ¼-inch letters.

(e) Each licensee shall immediately notify the department by telephone, and subsequently by confirming letter, if the licensee knows or has reason to believe that radioactive material has been lost in or to an underground potable water source. The notice shall designate the well location and shall describe the magnitude and extent of loss of radioactive material, assess the consequences of such loss, and explain efforts planned or being taken to mitigate these consequences. (Authorized by and implementing K.S.A. 48-1607; effective Sept. 20, 1993; amended Nov. 1, 1996.)

28-35-363. **Appendix A; training courses for logging supervisors; subjects.** (a) Each training course for logging supervisors shall cover the fundamentals of radiation safety, including:

(1) characteristics of radiation;

(2) units of radiation dose and quantity of radioactivity; and

(3) significance of radiation dose, including;

(A) radiation protection standards; and

(B) biological effects of radiation dose;

(4) levels of radiation from sources of radiation;

(5) methods of minimizing radiation dose, including:

(A) working time;

(B) working distances; and

(C) shielding; and

(6) radiation safety practices, including prevention of contamination and methods of decontamination.

(b) Each training course for logging supervisors shall cover radiation detection instrumentation to be used, including:

(1) use of radiation survey instruments, including training as to their:

(A) operation;

(B) calibration; and

(C) limitations;

(2) survey techniques; and

(3) use of personnel monitoring equipment.

(c) Each training course for logging supervisors shall cover the equipment to be used, including:

(1) handling equipment;

(2) sources of radiation;

(3) storage and control of equipment; and

(4) operation and control of equipment.

(d) Each training course for logging supervisors shall include:

(1) the requirements of pertinent federal and state regulations;

(2) the licensee's or registrant's written operating and emergency procedures; and

(3) the licensee's or registrant's record-keeping procedures. (Authorized by and implementing K.S.A. 1992 Supp. 48-1607; effective Sept. 20, 1993.)

Article 36.—FOOD SERVICE ESTABLISHMENTS, FOOD VENDING MACHINE COMPANIES AND LODGING ESTABLISHMENTS

MOBILE UNITS

28-36-1. **Fees; mobile units.** The license fee for mobile units engaged solely in the sales of prepackaged frozen desserts shall be five ($5) dollars for each such unit. (Authorized by K.S.A. 1978 Supp. 36-503; effective, E-77-45, Sept. 30, 1976; effective Feb. 15, 1977; amended, E-79-16, July 1, 1978; amended May 1, 1979.)

28-36-2 to 28-36-9. **Reserved.**

FOOD VENDING MACHINES AND FOOD VENDING MACHINE COMPANIES

28-36-10. **Definitions.** The following definitions shall apply in the interpretation and the enforcement of regulations pertaining to food vending machines and controlled location vending machines.

1. "Adulterated" shall be defined according to K.S.A. 65-664 of the Kansas food, drug and cosmetic act.

2. "Closed" means fitted together snugly leaving no openings large enough to permit the entrance of vermin (1/32" or less).

3. "Commissary" means catering establishments, restaurant, or any other place in which food, containers or supplies are kept, handled, prepared, packaged, or stored, and from which vending machines are serviced. *Provided*, That this term shall not apply to an area or conveyance at a vending machine location used for the temporary storage of packaged food or beverages.

4. "Controlled location vending machine" means a vending machine which: (a) dispenses only non-potentially hazardous food; (b) is of such design that it can be filled and maintained in a sanitary manner by untrained persons at the location; and, (c) is intended for and used at locations in which protection against environmental contamination is maintained at a satisfactory level.

5. "Corrosion-resistant material" means a material which maintains its original surface characteristics under prolonged influence of the food, cleaning compounds and sanitizing solutions which may contact it.

6. "Easily cleanable" means readily accessible and of such material and finish, and so fabricated that residue may be completely removed by normal cleaning methods.

7. "Employee" means any operator or any person employed by him who handles any food to be dispensed through vending machines, or who comes into contact with food-contact surfaces of containers, equipment, utensils, or packaging materials, used in connection with vending machine operations, or who otherwise services or maintains one or more such machines.

8. "Food" means any raw, cooked, or processed edible substance, beverage, or ingredient used or intended for use or for sale in whole or in part for human consumption. (K.S.A. 36-501(f)).

9. "Food-contact surfaces" means those surfaces of equipment and utensils with which food normally comes in direct contact, and those surfaces with which food may come in contact and drain back onto surfaces normally in contact with food.

10. "Food vending machine" means any self-service device which, upon insertion of a coin, coins or tokens, or by other similar means, dispenses unit servings of food, either in bulk or in packages without the necessity of replenishing the device between each vending operation but shall not include any vending machine dispensing only bottled or canned soft drinks, or prepackaged and nonpotentially hazardous food, chewing gum, nuts or candies. (K.S.A. 36-501 (g)).

11. "Food vending machine company" means any person who is in the business of operating and servicing food vending machines.

12. "Food vending machine dealer" means any manufacturer, remanufacturer or distributor of food vending machines who sells food vending machines to food vending machine companies.

13. "Regulatory authority" means the secretary of health and environment or his duly authorized representative.

14. "Secretary" means the secretary of health and environment.